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# NUCLEAR TECHNOLOGY AND THE FABRIC OF GOVERNMENT

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PROGRAM OF POLICY STUDIES IN SCIENCE AND TECHNOLOGY  
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## TABLE OF CONTENTS

	<i>Page</i>
Introduction .....	1
I. The Background .....	3
II. Government Organization .....	5
III. The Making of Policy .....	11
A. The Subsidy Problem .....	18
B. The Problem of Indemnity .....	20
C. The Question of State Jurisdiction .....	22
IV. The Government-Industry Relationship .....	25
V. The Role of the Specialists .....	33
VI. Conclusion .....	40

***"There may be a necessity for imposing stringent federal control and regulation over technology at the moment a new development comes into being." The splitting of the atom imposed such a necessity on the American government, and "expedience, rather than principle, has been the watchword" of the development of nuclear energy. Have public and private interests been accommodated adequately by this approach?***

## **NUCLEAR TECHNOLOGY AND THE FABRIC OF GOVERNMENT**

### *Introduction*

Government has always had a strong interest in science and technology. This interest exists on two basic levels. First, a thriving science and a developing technology are presumed to contribute to public welfare and national strength. Therefore, at the least, government endeavors to provide an environment conducive to the appropriate development and growth of technology, and sometimes provides also positive incentives or outright governmental support to assure an adequate development and growth.<sup>1</sup> On the second level, the growth of technology frequently poses problems of social, political, or economic order, and, in some instances, real threats to the health, safety, and security of the public.<sup>2</sup> Accordingly, government also endeavors to impose appropriate controls over technology to prevent injury to and abuse of the public.

Until the past few decades, technological development proceeded at a relatively leisurely, albeit rapidly accelerating, pace. For the most part, technological progress was regarded as a benefit, but not a necessity. There were, therefore, few compelling reasons for government's applying urgent spurs to develop new technology at

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<sup>1</sup> The Constitution of the United States, art. I, § 8, recognized the importance of promoting "the Progress of Science" by providing the basis for the patent system. Science and technology, of course, are not unique as objects of overt government promotion and support. For a general description of the evolution of the government interest in science and technology, see Dupree, *Science in the Federal Government* (1957).

<sup>2</sup> Ogburn, *National Policy and Technology*, in National Resources Committee, *Technological Trends and National Policy* 1, 9-11 (1937).

a rapid pace and within predetermined deadlines.<sup>3</sup> Correspondingly, the problems and the evils which sometimes accompany technological progress could be dealt with at the same leisurely pace.<sup>4</sup> As problems arose, they could perhaps be dealt with in the first instance under principles of common law, with aggrieved persons seeking to impose liability upon those who infringed their rights.<sup>5</sup> At the next higher level, local or state statutory remedies or controls might be provided. Finally, when the problems appeared to be of very substantial magnitude and crossed state jurisdictional lines, federal legislation or regulation would be imposed. This evolutionary process rarely resulted in controls adequate and timely to prevent some unfortunate injury to the public,<sup>6</sup> but it was consistent with the philosophy underlying our form of government—that governmental regulation and control be based only on necessity demonstrated by experience.

The extremely rapid, accelerating rate of technological development in the past few decades has placed severe strains upon the traditional role of American government in dealing with science and technology. As the margin of victory or defeat in war, and survival itself, have passed from the battlefield to the laboratory and industrial plant, it has become imperative that the United States government take all steps appropriate to assure that the United States' level of technological development is adequate to prevent our being placed at the mercy of potential enemies whose own technologies might produce more-ultimate weapons systems. As a result, the govern-

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<sup>3</sup> The Manhattan District's development of the atomic bomb represented the first instance of a real government effort to develop a new technology on an urgent basis.

<sup>4</sup> The prevailing view as late as 1937, only five years before the demonstration of nuclear fission opened the new atomic era, was that:

Though the influence of invention may be so great as to be immeasurable, . . . there is usually opportunity to anticipate its impact upon society *since it never comes instantaneously without signals*. For invention is a process and there are faint beginnings, development, diffusion, and social influences, occurring in sequence, all of which require time. From the early origins of an invention to its social effects the time interval averages about 30 years. (Emphasis added.)

Science Committee, Foreword to Technological Trends and National Policy viii, ix (1937).

<sup>5</sup> See Gilfillan, Social Effects of Inventions, in National Resources Committee, Technological Trends and National Policy 24, 38 (1937) [hereinafter cited as Gilfillan].

<sup>6</sup> As the Science Committee pointed out, *supra* note 4, at x, "The time lag between the first development and the full use of an invention is often a period of grave social and economic maladjustment, as, for example, the delay in the adoption of workmen's compensation and the institution of 'safety first' campaigns after the introduction of rapidly moving steel machines."

ment has invested billions of dollars in science and technology pointed towards development of the means to national security. This phenomenon, coupled with the largely independent, cumulative acceleration of scientific and technological progress, has led to developments which have a direct and immediate impact upon the health, safety, and security of the public.<sup>7</sup> Some of this development has had consequences of such magnitude as to raise serious question about the capacity of our conventional legal and governmental institutions to deal effectively with the problems generated by the new techniques.<sup>8</sup> For the first time, perhaps, there may be a necessity for imposing stringent federal control and regulation over technology at the moment a new development comes into being, if not even earlier.

The atomic energy experience provides a useful illustration of the problems which government has faced in dealing with a major new technology and of the effect of these problems upon government institutions. The atomic energy technology, a new field with tremendous potential, fraught with extreme hazard, was created almost overnight, taxing the ingenuity of the American system of government. In this article, we shall explore some of the ways in which American government has changed and adapted to meet the demands of the new technology.

## I. THE BACKGROUND

During World War II, the United States embarked upon a major effort, conducted in total secrecy so far as the American public was concerned and entirely at government expense, to develop an atomic bomb. The result of that effort brought the war against Japan to an immediate and abrupt conclusion. If the bomb had been developed at an earlier date, it possibly would have brought the war against Germany to an equally immediate and abrupt end. The atomic bomb was regarded as an absolute or ultimate weapon with awesome destructive potential dwarfing that of any previously known weapon.

<sup>7</sup> For example, consider the effect on the public of radiation, food additives, pesticides, new drugs, and electronic eavesdropping equipment.

<sup>8</sup> The case of radiation is instructive. It seems clear that one price of development of nuclear technology (for war and peace) is that human beings are subjected to man-made radiation, the effects of which may range from "undesirable" to "harmful." From the standpoint of government institutions, there is still no definitive, confidence-inspiring mechanism for assessing such effects, or for formulating a national policy which balances the need for nuclear technological development against the social costs of only partially known radiation effects on human beings. Nor is it clear that our present legal structure for enforcement of private rights to recovery for radiation injury is completely satisfactory.

At the same time, the principle of nuclear fission which underlay the bomb unlocked tremendous new sources of energy which had substantial promise for peaceful industrial, medical, scientific, and agricultural applications.

At the end of World War II, the government, with a sense of awesome responsibility, commenced consideration of a national policy for the control, development, and use of atomic energy. The problem may be succinctly stated: How would the United States organize and manage the atomic energy program so as to preserve the American monopoly over atomic weapons; develop, improve, and produce an atomic weapons stockpile adequate for the national security; develop the peaceful uses of atomic energy; and assure that all this would be accomplished in a manner consistent with the public interest?

After lengthy and thorough public and intragovernmental debate and discussion, the solution was embodied in the Atomic Energy Act of 1946.<sup>9</sup> The heart of the national atomic energy program would be conducted as an absolute government monopoly, with private activity permitted only in peripheral areas<sup>10</sup> and subject to stringent regulation. Management of the entire program was vested in a five-man civilian Atomic Energy Commission.<sup>11</sup> This Commission was charged with the positive responsibility for conducting a program of federal research and development to assure "an adequate scientific and technical accomplishment"<sup>12</sup> and a program for assisting and fostering private research and development (through contracts, agreements, and loans) so as to "encourage maximum scientific progress."<sup>13</sup> Beyond this, it was responsible for a program of "Government control of the production, ownership, and

<sup>9</sup> 60 Stat. 755 (1946).

<sup>10</sup> Private mining of uranium was freely permitted, but possession, ownership, and use of uranium were permitted only on a licensed basis. 60 Stat. 761-62 (1946). Byproduct material (radioisotopes) could be owned, possessed, and used subject to license. 60 Stat. 763 (1946). Private ownership of reactors was permitted only for research and development purposes, and only if they were sufficiently small that weapon-quantities of fissionable material could not be produced. 60 Stat. 759 (1946). All other reactors were to be government-owned. 60 Stat. 759 (1946). Title to all fissionable material was absolutely vested in the government and private possession and use was permitted only for research and development purposes and then only in quantities less than could be used for weapons. 60 Stat. 760-61 (1946). Reactors and fissionable material could not be used by private persons for practical purposes until a comprehensive report had been submitted to the Congress on the "social, political, economic, and international effects of such use," along with recommendations for necessary or desirable legislation. 60 Stat. 764 (1946).

<sup>11</sup> 60 Stat. 756 (1946).

<sup>12</sup> 60 Stat. 756 (1946).

<sup>13</sup> 60 Stat. 756, 758 (1946).



use of fissionable material to assure the common defense and security and to insure the broadest possible exploitation" of the technology.<sup>14</sup> Thus, the AEC had broad authority and responsibility for research, development, and production throughout the entire area of military and peaceful applications of atomic energy. To protect the secrets of atomic energy and to preserve the American monopoly, the act established a comprehensive and unprecedented system of information control to be administered by the AEC<sup>15</sup> and imposed rigid limitations on nuclear intercourse with other nations.<sup>16</sup> To protect and enforce the statutory scheme, the act included numerous severe criminal sanctions to be imposed against those who might violate its various prohibitions.<sup>17</sup> The act also reflected concern on the part of Congress as to its own role in legislation and oversight in the atomic energy sphere in the creation of a unique legislative institution, the Joint Committee on Atomic Energy.<sup>18</sup>

This statutory scheme represented, at almost every point, a departure from the traditions and practices of American government. One can fairly conclude that the authors of the 1946 act threw up their hands in despair at the prospect of dealing with nuclear technology within the framework of traditional techniques of government and concluded that the revolutionary force of atomic energy could be dealt with only through revolutionary processes of government. More important, however, from the standpoint of historical perspective, is the fact that the innovations of the 1946 act laid the basis for the continuing practice and policy of innovation and improvisation which has pervaded the national atomic energy program to this day.

## II. GOVERNMENT ORGANIZATION

The basic function of the Atomic Energy Commission at the time of its creation was to operate a vast industrial complex and its associated research and development program within the budgetary framework laid down by the President and, in several important re-

<sup>14</sup> 60 Stat. 756 (1946).

<sup>15</sup> 60 Stat. 766-68 (1946). AEC probably has authority under this provision, presently found in the Atomic Energy Act of 1954, 68 Stat. 940-43 (1954), 42 U.S.C. §§ 2161-66 (1958), as amended, 42 U.S.C. §§ 2162, 2163, 2165 (Supp. IV, 1963), to enjoin publication or other dissemination of classified atomic energy information in violation of the information control structure. See Green, *Information Control and Atomic Power Development*, 21 *Law & Contemp. Prob.* 91, 94 n.17 (1956), for an example of AEC's interference with publication on security grounds.

<sup>16</sup> 60 Stat. 760, 766 (1946).

<sup>17</sup> 60 Stat. 766-67, 773-74 (1946).

<sup>18</sup> 60 Stat. 772 (1946).

spects, subject to the specific directives of the President. Governmental functions of this character typically have been entrusted to a single-headed government agency headed by a cabinet officer or administrator directly accountable to, and subject to the control of, the President.<sup>19</sup> Multimember boards or commissions such as the AEC, whose members are appointed for fixed, staggered terms usually are established to perform quasi-judicial regulatory and quasi-legislative rule-making functions so as to remove them from the control of the President and hence from the arena of politics.<sup>20</sup> Nevertheless, despite the fact that the agency administering the atomic energy program, in the early years at least, would have virtually no regulatory or rule-making functions,<sup>21</sup> the commission form was adopted for this agency. This innovation reflected primarily the beliefs that atomic energy was too big and too important to be entrusted to any single person<sup>22</sup> and that sound conduct of the program required the balanced judgment of a group of commissioners drawn from various walks of life.<sup>23</sup> It also reflected the desire to have the program conducted by an inde-

<sup>19</sup> As Secretary of the Interior Ickes expressed it: "Multiheaded boards are fine for discussion, and they may well be suited for judicial or quasi-judicial jobs that require no initiative on the governmental side. But they just won't do the work where you have a task that requires drive, initiative, and direction emanating from a central authority while coordinating the efforts of a great staff." *Hearings Before the Special Senate Committee on Atomic Energy on S. 1717, 79th Cong., 2d Sess.* 94 (1946).

<sup>20</sup> See *Humphrey's Executor v. United States*, 295 U.S. 602 (1935). For a discussion of the merits of a single administrator versus a plural board, see Newman, *The Atomic Industry: An Experiment in Hybridization*, 60 *Yale L.J.* 1263, 1264-73 (1951).

<sup>21</sup> The AEC's regulatory and rule-making functions were in fact virtually nil until enactment of the 1954 legislation. As late as 1960, members of the Commission were spending less than one-fourth of their time on regulatory matters. Staff of the Joint Committee on Atomic Energy, 87th Cong., 1st Sess., *Improving the AEC Regulatory Process* 15 (Comm. Print Vol. 1, 1961). Newman seems to argue that, during the early years of a largely operational function, the main need may be for "policy-making," a quasi-legislative function warranting the use of a plural board. Newman, *supra* note 20, at 1266.

<sup>22</sup> "To make policies affecting our lives, our safety, and the whole shape and substance of our future demands constant attention to the whole problem of atomic energy in our society. This is no job for a part-time executive or single administrator . . . no matter how long may have been his practical engineering experience, how brilliant his recent success, or how complete his understanding of our atomic energy development in all its scientific, technological and administrative detail." 92 *Cong. Rec.* 6097 (1946) (remarks of Senator McMahon).

<sup>23</sup> This was most clearly articulated by Congressman Chet Holifield in 1954: "[T]he important point is that in this tremendous, gigantic development, particularly with its implications for the future in regard to economic impact, international impact, and social impact, that we should have a wide and varied background of administration so that all viewpoints could be brought to bear upon these great questions of policy." *Hearings Before the Joint Committee on Atomic Energy on S. 3323 and H.R. 8862, 83d Cong., 2d Sess.* 291 (1954) [hereinafter cited as *Hearings on S. 3323 and H.R. 8862*]. [Joint Committee on Atomic Energy is hereinafter cited as JCAE.]

pendent body, with built-in continuity, somewhat removed from partisan considerations and presidential control.

At the other end of the government spectrum, the Congress, the Joint Committee on Atomic Energy was created as a counterweight to the extraordinary powers vested in the executive branch for conduct of the atomic energy program. The JCAE represented the solution to the problem faced by Congress in attempting to maintain legislative control over the very broad nuclear enterprise which was to be conducted in large part under conditions of secrecy, and which was largely obscured by the esoteric scientific jargon which was obviously beyond the comprehension of ordinary members of Congress.<sup>24</sup> This Committee was unique in three major respects. First, it was the first—and it remains the only—joint committee vested with the power of a standing committee, *i.e.*, the power to consider and act on legislation.<sup>25</sup> Second, unlike other standing committees which are creatures of the House and the Senate internal Rules, the JCAE is a creature of statute. And third, the relationship of the JCAE to the executive branch is defined by the statute and does not, as in the case of other committees, rest on political interplay based on constitutional principles. Thus, the statute explicitly required the AEC to keep the JCAE “fully and currently informed” as to its activities and authorized the JCAE to use “the services, information, facilities, and personnel” of the executive branch.<sup>26</sup>

Clearly, the statute contemplated a special and a unique relationship between the AEC and the JCAE, and this relationship, over the years, has become the dominant element in the governmental structure for dealing with atomic energy. During the early years, the JCAE confined its role largely to that of the legislative “watchdog.” In the early 1950’s, however, the JCAE began to demand that the AEC display a greater degree of imagination and daring in its programs and consistently pressed for expansion of the atomic energy program. After winning the AEC to its point of view, the JCAE would then characteristically join with the AEC to exert pressure within both the executive branch and the Congress to accomplish their joint ob-

<sup>24</sup> The legislative history of the 1946 Act does not include any particularly useful information about the reasons for creation of this unique committee. See Green & Rosenthal, *Government of the Atom: The Integration of Powers* 4 (1963) [hereinafter cited as Green & Rosenthal].

<sup>25</sup> Other joint committees exist, but they operate only to perform service or staff functions and do not have legislative powers. See Green, *The Joint Committee on Atomic Energy: A Model for Legislative Reform?*, 32 *Geo. Wash. L. Rev.* 948 (1964).

<sup>26</sup> 60 Stat. 772-73 (1946).

jectives. This was the period of symbiotic relationship when the JCAE and the AEC, in effect, acted to enhance the powers of each other.<sup>27</sup> By 1955, however, the monolith had cracked, and serious frictions developed between the Democratic-controlled JCAE and the Republican administration. The major issues in controversy concerned, for the most part, the insistence of the JCAE that the executive branch adopt or expand programs particularly desired by the JCAE. Largely through skillful and frequently brutal<sup>28</sup> exercise of its statutory right to be kept fully and currently informed—first transforming its right to know about the AEC's actions into a right to be informed in advance of AEC's contemplated actions, and then translating the latter right into the right to participate in and shape decisions—the JCAE by 1957 achieved unquestioned domination over the AEC's own program,<sup>29</sup> and then made the AEC a sometimes willing and sometimes reluctant tool of the JCAE to accomplish the JCAE's objectives at other or higher levels of the executive branch.<sup>30</sup>

Thus, despite the general trend of the past several decades toward expansion of the role of the executive, and the corresponding decline of importance of the Congress in setting national policy, a trend largely initiated and accelerated by the increasing technologically-bred complexity of government, executive power in the atomic energy field has been curbed and the power of a congressional agency has been enhanced. Such a development ordinarily would warrant the approbation of those concerned with the strengthening of democratic government, but this is not an ordinary situation. Most of the JCAE's accomplishments have been brought about through its exertion of pressure within the executive branch. Typically, the AEC and frequently the executive branch as a whole are forced into agreement or compromise with the JCAE so that basic policy decisions are made by and between these two bodies, and without the participation of the Congress as a whole.<sup>31</sup> Where congressional participation is required, as where an appropriation must be authorized by the Congress or organic legislation must be enacted, the bill typically emerges from the JCAE with all policy issues resolved so that it may be rubber-stamped by the Congress as a noncontroversial matter.<sup>32</sup>

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<sup>27</sup> Green & Rosenthal 6-12.

<sup>28</sup> *Id.* at 89-111.

<sup>29</sup> *Id.* at 12-17.

<sup>30</sup> *Id.* at 17-19.

<sup>31</sup> *Id.* at 108-109.

<sup>32</sup> *Id.* at 134-48, 194-97.

Unlike other congressional committees which function primarily to review and limit the ordinary expansionist tendencies of a bureaucracy, the JCAE has a positive philosophy and program of its own. More frequently than not, it presses for expansion, not curtailment, of executive programs and expenditures.<sup>33</sup> On many occasions, nuclear programs which have been rejected or deferred by the AEC or by the President because of budgetary constraints imposed by the President are restored by the JCAE and forced upon the executive branch.<sup>34</sup> In some cases, because of its feelings of urgency, the JCAE has thrust crash programs on the executive branch long before the executive itself was prepared to recommend them, let alone implement them.<sup>35</sup> To a significant extent, questions of priorities and technical feasibility are determined by the JCAE with its obviously limited (relative to the executive branch) technical staff resources. Moreover, all this is accomplished by the JCAE without any real accountability to higher authority. Thus, the JCAE, although organically a part of the Congress, performs a major part of its function through non-legislative means, and it is, to a remarkable extent, a power center of its own, largely independent of the Congress, and functionally situ-

<sup>33</sup> *Id.* at 105.

<sup>34</sup> As the then chairman of the JCAE in 1961 stated in hearings on the AEC's authorizing legislation for fiscal year 1962, the JCAE "reserves the right to recommend projects and levels of support which it believes necessary or important to national interests." Hearings Before the Subcommittee on Legislation of the JCAE on AEC Authorizing Legislation Fiscal Year 1962, 87th Cong., 1st Sess. 444 (1961). For examples of this process see Green & Rosenthal 84-87.

<sup>35</sup> For example, in March 1960, the JCAE concluded, while the executive branch was still studying the matter, that nuclear power reactors should be located at McMurdo Sound in the Antarctic, and pressed upon the reluctant executive an urgent program for design and procurement so that the construction season starting that December could be fully utilized. See Green & Rosenthal 247-252. This project has since encountered some difficulty. The reactor was delivered to McMurdo Sound late in 1961 and was operated by the manufacturer on a test basis until March 1964, when it was accepted by the AEC and transferred to the Navy Department. As recently as February 25, 1964, the AEC's Advisory Committee on Reactor Safeguards expressed "major reservations" as to the safe operation of this reactor largely because of the "unusual meteorology of the Antarctic site." See Hearings Before the JCAE on AEC Authorizing Legislation for Fiscal Year 1965, 88th Cong., 2d Sess. 443-64 (1964). Senator Clinton Anderson (who was Chairman of the JCAE in 1960 when the McMurdo Sound reactor was thrust upon the executive branch, and who personally exerted strenuous efforts to have the reactor constructed on an urgent basis) recently conceded that the McMurdo Sound reactor "hasn't worked out very well." In assessing responsibility for this state of affairs, he criticized the AEC for paying the reactor manufacturer before the reactor was demonstrated to be fully operable, and also called attention to divided responsibility between the AEC and the Navy. Thinking Ahead with Clinton P. Anderson: The Politics of Science, International Science and Technology, April 1964, at 56-57. Query whether the major onus for the fiasco rests upon the JCAE for what may have been a precipitous and premature program for manufacture and installation of this reactor. If so, how will the Congress and the public ever know? Whose heads will roll?

ated somewhere between the executive branch and the Congress.<sup>36</sup>

The JCAE's role has persistently involved breaches of the doctrine of separation of powers, and it has repeatedly entered areas long regarded as the exclusive constitutional domain of the executive.<sup>37</sup> Beyond this, it has made a shambles of the executive's budgetary processes in the atomic energy field. Nevertheless, the executive branch has voiced only feeble protests over such inroads,<sup>38</sup> and the precedents established by the JCAE's involvement in the affairs of the executive branch are so well established that a reversal seems highly improbable.

In part, at least, the acquiescence by the executive branch in the unique role of the JCAE is attributable to the fact that the AEC has never become firmly established as a part of the executive branch. Although the President is responsible under the Atomic Energy Act for directing the AEC in several important respects,<sup>39</sup> and although he has substantial control through the budgetary process, the fact that the program is administered by a five-man commission undoubtedly lessens both his interest and his control. Moreover, the special relationship between the Commission and the JCAE has always been of greater significance than the relationship of the Commission to its sister executive agencies<sup>40</sup> and to the President. For example, differences of opinion within the Commission might never come to the attention of the President, but the JCAE insists that such differences be brought to it.<sup>41</sup> Another factor has been that, during the early

<sup>36</sup> Green & Rosenthal 272. The nature of the JCAE and its role provides a remarkable vehicle for the scientific or engineering expert who can "sell himself" to the JCAE. For example, Admiral Rickover has always had a "tremendous hold," i.e., great influence, over the JCAE, and Senator Anderson concedes that he personally "just followed him blindly and never had occasion to regret it." *Thinking Ahead* with Clinton P. Anderson: The Politics of Science, *supra* note 35, at 58.

<sup>37</sup> Green & Rosenthal 111-14.

<sup>38</sup> Green & Rosenthal 113.

<sup>39</sup> The basic level of the AEC program is set by the President's annual determinations as to the quantity of special nuclear material to be produced, and the number of nuclear weapons to be produced. The Atomic Energy Act of 1954, 68 Stat. 928, 936 (1954), 42 U.S.C. §§ 2061(b), 2121(a)(2) (1958). In addition, presidential assent is required for the designation of new special nuclear materials and new source materials. 68 Stat. 929, 932 (1954), 42 U.S.C. §§ 2071, 2091 (1958). Presidential authorization and approval are also required for certain international actions under the Act. 68 Stat. 936, 940, 942 (1954), as amended, 42 U.S.C. §§ 2121, 2153, 2164 (1958). See Green & Rosenthal 77 n.12.

<sup>40</sup> Other agencies have always been concerned that the AEC's duty to keep the JCAE fully and currently informed makes the AEC a pipeline for premature or undesired disclosure of information to the Congress. *The End of the Sacred Atomic Preserve*, Address by Commissioner John G. Palfrey before the American Nuclear Society in Chicago, Illinois, Dec. 5, 1963 [hereinafter cited as *Palfrey Address*].

<sup>41</sup> The JCAE has sometimes exacted a pledge from nominees to the Commis-

years at least, the AEC had occasion for relatively little contact with most of its sister agencies within the executive branch, and such communication as existed was severely impeded by the stringent statutory requirements for AEC security clearance. As recently as December of 1963, a member of the Atomic Energy Commission could say:

Over the years, the separate status of the Commission and its special statutory relationship with the Congress led other agencies to shy from dealings with it. In new undertakings that involved the atom, the impulse in other agencies was to proceed as long as possible without consulting the AEC, on the principle that if you ever did consult, the Commission would say no, and besides you were likely to get prematurely involved with the Congress.

• • •

My principal reaction, however, to recent developments and comments on status is not that the Commission has been downgraded but that the atom has been upgraded. The atom has been assimilated into affairs of the nation. A variety of agencies are properly concerned with it, their interests are recognized and the issues are examined at the highest level, with the participation of the affected parties.

And in the process, the Atomic Energy Commission has begun to join the Executive Branch of the government. The process is not complete (the Commission is still apt to use the word "They" when referring to the Administration, in testimony before Congress), and the implications and ramifications of this occurrence are not fully realized. And when they are, life may not necessarily be simplified, at the outset. But before long, I believe it will be.<sup>42</sup>

Thus we see in the government structure for handling atomic energy the thoroughly unique situation of an extremely important and large program nominally conducted by an executive agency which is not quite part of the executive branch, and in fact dominated by a congressional committee which is not quite part of the Congress. This anomalous structure has had substantial impact on the fabric of government.

### III. THE MAKING OF POLICY

As we have observed, many important policy decisions concerning nuclear technology are made through intervention by the

sion, during the course of confirmation hearings, requiring them to inform the JCAE of their votes as commissioners. See Green & Rosenthal 100.

<sup>42</sup> Palfrey Address.

JCAE in the decisional processes of the executive branch, so that basic policies do not reflect a broad-based public support, or even public awareness, of the issues. Similarly, where legislation is required for formulation or implementation of policy, it is frequently handled as a largely intramural or bilateral affair between the AEC and the JCAE, with the presumption that the legislation is desirable and necessary and therefore should be enacted as quickly as possible; accordingly, through a process of bargaining and striving for consensus, the legislation as it emerges from JCAE consideration is usually stripped of all apparent policy issues and is presented as non-controversial legislation on which all interested parties are in agreement. One result of this process is that atomic energy legislation tends to be insular in nature, without regard to broader policy issues, and usually represents a jerry-built improvisation to meet an immediate problem. Examples drawn from the Atomic Energy Act of 1954 and some of its aftermath demonstrate, first, that the insularity of the nuclear policy formulation process precludes cross-fertilization and impregnation with useful concepts or queries from external sources, and, second, that the atomic energy experience in pioneering government's relationship to technology remains so bottled up in the notion that atomic energy is unique that there is virtually no translation into analogous technological areas.

The basis for the 1954 act was found in the great technological progress which was achieved under the 1946 act. The atomic bomb had evolved into a "family of weapons" for tactical and strategic use by ground, sea, and air forces. The atomic bomb—the absolute and ultimate weapon of 1946—was soon dwarfed in destructive power by the hydrogen bomb. Nuclear propulsion systems for submarines were developed and proved. Uranium ore, the basic raw material of atomic energy which was in short supply in 1946, became plentiful as a result of AEC programs to develop ore reserves in the United States and other free world nations. Numerous peaceful applications of atomic energy were developed, and by 1954 it was believed that the United States was at the threshold of developing a nuclear power industry.<sup>43</sup>

During the same period, there were also important developments in other nations. Canada and the United Kingdom had both de-

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<sup>43</sup> See President Eisenhower's Message of February 17, 1954, transmitting Recommendations Relative to the Atomic Energy Act of 1946, H.R. Doc. No. 328, 83rd Cong., 2d Sess. 1 (1954) [hereinafter cited H.R. Doc. No. 328]; H.R. Rep. No. 2181, 83d Cong., 2d Sess. 1-4 (1954).



veloped substantial atomic energy capability, and the latter had developed an atomic bomb on its own. More importantly, the Soviet Union had developed both an atomic bomb and a hydrogen bomb and had demonstrated substantial capability to develop peaceful applications of atomic energy as well.

These developments at home and abroad led to extensive reconsideration of some of the premises underlying the Atomic Energy Act of 1946. It had become obvious that other nations had developed and could refine nuclear weapons despite the provisions of the 1946 act intended to preserve the American monopoly. It was also recognized that continuation of the United States policy of isolation in atomic energy matters would impair the ability of the free world to defend itself against Soviet aggression and would result inevitably in the leadership of other nations, perhaps even the Soviet Union; in bringing the peaceful fruits of atomic energy to a world eager to receive them.<sup>44</sup> It was recognized, too, that the "island of socialism" created by the 1946 act's government monopoly and its provisions barring private investment in atomic energy were basically incompatible with long-standing American traditions of private enterprise.<sup>45</sup> Beyond this, it was felt that if the United States was to take the leadership in developing peaceful applications of atomic energy, this objective could best be achieved by taking advantage of the "cost-cutting and other incentives of free and competitive enterprise."<sup>46</sup>

Starting in 1950, the Atomic Energy Commission undertook a thorough reconsideration of the basic premises underlying the Atomic Energy Act of 1946 in the light of events since 1946. By early 1953, the decision was reached that the government monopoly should be abandoned and that private enterprise should be permitted to enter the mainstream of the technology on a licensed basis.<sup>47</sup> For the better part of two years, during 1952 and 1953, the AEC and other in-

<sup>44</sup> President Eisenhower's Message, *supra* note 43.

<sup>45</sup> The issue was couched more in terms of the advantages to be gained from private participation than in terms of philosophical considerations. As AEC Chairman Strauss expressed it on July 31, 1953, in paraphrasing the answer he gave in 1946 or 1947 to a question then put by Senator Vandenberg as to Strauss' "general attitude towards the socialistic provisions of this act": "It is my hope that in our lifetimes conditions will improve to the point where atomic energy can be freed of Government monopoly and placed in the framework of the American system of free competitive enterprise." Hearings Before the JCAE on Atomic Power Development and Private Enterprise, 83d Cong., 1st Sess. 565 (1953).

<sup>46</sup> H.R. Rep. No. 2181, *supra* note 43, at 3.

<sup>47</sup> Hearings Before the JCAE on Atomic Power Development and Private Enterprise, 83d Cong., 1st Sess. 6 (1953).

terested components of the executive branch wrestled with the exceptionally complex problems involved in opening the industry to private enterprise.<sup>48</sup> On February 17, 1954, a legislative package was submitted to the JCAE for its consideration. The executive branch recognized the importance and the complexity of the issues and had no feeling of urgency about the legislation. It expected, and was prepared for, lengthy congressional consideration over a period of at least a year.<sup>49</sup>

Almost immediately upon receipt of the executive's proposals, the JCAE, without even holding hearings, discarded them<sup>50</sup> in favor of drafting its own comprehensive revision of the 1946 act and, moreover, announced its intention to enact this revision before Congress adjourned in 1954. A draft bill was prepared by the JCAE and was discussed on a staff level within the executive branch and between the JCAE and executive agency staffs.<sup>51</sup> On April 15, 1954, a revised bill was introduced in the House of Representatives<sup>52</sup>—the first public disclosure of the contemplated revisions in the law. On May 3, 1954, the JCAE commenced hearings on this bill in executive session with testimony from officials of the executive branch. The closed hearings continued May 4, May 5, and May 7. During these hearings, and in simultaneous staff discussions, basic differences of opinion on issues, including some major policy issues, were resolved. By the time the extensive public hearings commenced on May 10, the bills on which the hearings were held were already obsolete and were undergoing drastic revision. By the time the bill was reported by the

<sup>48</sup> Among others, the AEC, Department of Defense, Department of Interior, Department of State, Department of Commerce, and Federal Power Commission were engaged in this exercise.

<sup>49</sup> This package consisted of two separate draft bills. One draft bill, regarded by the executive branch as urgent, provided for limited cooperation with other nations in atomic energy matters and for introducing some flexibility into the AEC's statutory security program. The other draft bill was not regarded as urgent and contemplated revision of the act to permit private enterprise participation. The fact that the draft bills were transmitted directly to the JCAE, rather than to the Congress along with the President's Message (*supra* note 43) of the same date, meant that the draft bills could be kept from public view. As a matter of fact, the bills reflecting the administration's own views and desires, as well as fundamental policy issues and differences (see text at notes 60-63 *infra*), were never revealed to the House or to the Senate until they were forced out of the JCAE's files on July 17, 1954. 100 Cong. Rec. 10,800-01 (1954).

<sup>50</sup> As Congressman Cole, then Chairman of the JCAE, expressed it, the administration's proposals were drafted "so broadly and . . . gave the President such rather complete, unlimited, and unrestricted authority . . . that I would not introduce it." 100 Cong. Rec. 11,656 (1954).

<sup>51</sup> For the text of this draft bill, see U. S. Atomic Energy Commission, *Legislative History of the Atomic Energy Act of 1954*, 53-104 (Losee Comp. 1955).

<sup>52</sup> H.R. 8862, 83d Cong., 2d Sess. (1954).

JCAE on July 12,<sup>53</sup> all major differences of opinion between the JCAE and the executive had been resolved or compromised. After extensive debate—indeed, a long filibuster—mainly concerned with peripheral issues and not with the basic policy considerations underlying the bill,<sup>54</sup> the bill was finally passed by the Congress on August 17, 1954, and was signed into law by the President on August 30, 1954.<sup>55</sup>

Thus, the bill was finally passed by the Congress six months after the legislative proposals were received, four months after the provisions of the bill were first revealed to the Congress as a whole and to the public, and three months after public hearings commenced.

The bill as passed authorized the licensed activity of private enterprise in the entire area of atomic energy technology except the weapons program;<sup>56</sup> opened the door to limited cooperation in atomic energy matters with friendly nations;<sup>57</sup> and increased the AEC's flexibility in handling its information control program.<sup>58</sup> The basic organizational structure of the 1946 act remained essentially unchanged. What is highly significant is that the concept of government monopoly was abandoned with scarcely any debate.<sup>59</sup> Beyond this, lesser but nevertheless extremely important policy issues were totally concealed from public view. For example, it was decided that

<sup>53</sup> H.R. Rep. No. 2181, *supra* note 43.

<sup>54</sup> Debate concerned mostly the extraneous Dixon-Yates controversy which provided a basis for the "giveaway" slogan; the issue of the AEC's authority, never previously nor to this date exercised, to impose compulsory licensing of certain patents; and the largely theoretical issue of priority and preference for public power bodies.

<sup>55</sup> Atomic Energy Act of 1954, 68 Stat. 919 (1954).

<sup>56</sup> "Production facilities" and "utilization facilities," statutory terms embracing principally nuclear reactors, could be owned, constructed, possessed, and operated pursuant to license. 68 Stat. 936-37 (1954), 42 U.S.C. §§ 2131-34 (1958). Special nuclear (*i.e.*, fissionable) material (see note 61 *infra*) could be possessed, used, and produced pursuant to license. 68 Stat. 928-32, 42 U.S.C. §§ 2061(c), 2073, 2077 (1958). Weapons possession, ownership, and manufacture were banned. 68 Stat. 936 (1954), 42 U.S.C. § 2122 (1958).

<sup>57</sup> 68 Stat. 931, 932, 933, 935, 939-40, 942 (1954), 42 U.S.C. §§ 2074, 2077, 2094, 2112, 2153, 2164 (1958).

<sup>58</sup> The standard for declassification of atomic energy information was relaxed. 68 Stat. 941 (1954), 42 U.S.C. § 2162(a) (1958). In addition, the AEC was for the first time authorized to relate the scope and extent of security investigations required by the statute to the nature and significance of the access to classified information involved. 68 Stat. 942 (1954), 42 U.S.C. § 2165(f) (1958).

<sup>59</sup> Two and a half years earlier, a leading authority on atomic energy law, anticipating the pressures for abandonment of the government monopoly, asked: "What has happened . . . to the innocent notion that the benefits of atomic energy should accrue to the nation as a whole—without the prior drain of private profits—since the resource itself was brought to fruition by public funds?" Newman, *supra* note 20, at 1391. Although the bitter Senate filibuster evoked cries of "giveaway," there was really no serious congressional opposition to the principle of opening the door to private participation on an enterprise basis.

absolute government ownership of fissionable material be continued,<sup>60</sup> contrary to the initial position of the executive branch that private ownership be permitted.<sup>61</sup> Although the decision to retain the government monopoly over fissionable material had profoundly important implications and economic consequences,<sup>62</sup> the reasoning underlying the executive branch's initial recommendations and the basis for the JCAE's opposition were never fully disclosed or discussed.<sup>63</sup>

<sup>60</sup> 68 Stat. 929-30 (1954), 42 U.S.C. § 2072 (1958).

<sup>61</sup> President Eisenhower's Message asked for legislation to "relax statutory restrictions against ownership or lease of fissionable material." H.R. Doc. No. 328, *supra* note 43. The administration's bill, however, unequivocally provided for private ownership as well as leasing of fissionable material. (Emphasis added.) See 100 Cong. Rec. 10,801 (1954). By the time the AEC testified in public hearings on the bill, the decision had been made to continue government ownership of "special nuclear material" (a new statutory term introduced in the 1954 Act as a substitute for "fissionable material"). 68 Stat. 294 (1954), 42 U.S.C. § 2014 (y) (1958). Thus, when AEC Commissioner Campbell testified, he said only that the Commission's "original recommendations . . . contemplated the possibility of private ownership" so that the government would not be obligated to purchase privately produced special nuclear material and the licensee would have "some incentive" to seek a commercial outlet. Nevertheless, the AEC acquiesced in continued government ownership. Hearings on S. 3323 and H.R. 8862, p. 600.

<sup>62</sup> Special nuclear material, under the 1954 Act, would be made available to private persons for use as reactor fuel on a lease basis, subject to payment by the licensee of use charges established by the AEC which could be waived by the AEC in all cases except those involving facilities licensed under section 103 as "commercial facilities." 68 Stat. 930 (1954), 42 U.S.C. § 2073(c), (d) (1958). With respect to section 103 facilities, see note 65 *infra*. Moreover, since all special nuclear material became the property of the government immediately upon its production, the AEC was required to pay the licensee a "fair price" for producing the material. 68 Stat. 929-30 (1954), 42 U.S.C. § 2072 (1958), and was authorized to establish "guaranteed fair prices" for periods not in excess of seven years. 68 Stat. 931-32 (1954), 42 U.S.C. § 2076 (1958). Thus, the embryonic industry was intertwined with a governmental interest, since its foundation would be fuel owned by the government, and a paramount element in the industry's economics would be the use charges and guaranteed fair prices established by the AEC. Beyond this, the "fair price" set by the AEC was to be based on the value of the material for its "intended use" by the government. 68 Stat. 931-32 (1954), 42 U.S.C. § 2076 (1958). Such use for the foreseeable future would be essentially in weapons. For a discussion of the economic significance of government ownership, see Mullenbach, *Civilian Nuclear Power* 153-55, 179-80 (1963). It has been estimated that the "buy-back" commitment, which is an essential ingredient of government ownership, could result in AEC payments to reactor owners of hundreds of millions of dollars over a period of years. *Ibid.*; Morrisson, *Federal Support of Domestic Atomic Power Development—The Policy Issues*, 12 Vand. L. Rev. 195, 204 (1958).

<sup>63</sup> Congressmen Holifield and Price assailed the government ownership of special nuclear material as a "built-in subsidy" with "intertwined complexities" involving unexplored "legal ramifications of the intermingled incidents of public and private ownership in nuclear-producing facilities. . . ." Nevertheless, they accepted the necessity for government ownership and used their argument as a basis for urging delay in enactment of the bill so as to permit fuller consideration. H.R. Rep. No. 2181, *supra* note 43, at 130-31. Mullenbach, *supra* note 62, at 153, points out that the decision to maintain government ownership of special nuclear material was based on "uncritically examined national security considerations" which were accepted "as an article of faith and doctrine."

The act was amended in August 1964, to terminate mandatory government ownership of special nuclear material and to require, after a transitional period, private

The legislation originally proposed by the executive branch to open the nuclear industry to private enterprise was drafted within the context and framework of the 1946 act and represented the minimum feasible amendment of that act to accomplish the desired objective in a manner consistent with the public interest. The administration bill contemplated a slow process of private entry into the field and further revisions of the act from time to time until "peacetime applications of atomic energy have been further developed, and until experience has been gained in the licensing and regulation of peacetime uses. . . ." <sup>64</sup> The 1954 act as it was finally adopted, however, did not reflect any such tentative, empirical approach. On the contrary, it purported to lay down a detailed blueprint<sup>65</sup> for the development and regulation of the peaceful technology which was not then even in existence, and whose problems and implications could only be surmised. This was an extremely large legislative undertaking to be accomplished in the space of so few months, and it is obvious that there were some major miscalculations and omissions. The manner in which such miscalculations and omissions were subsequently identified and handled can be demonstrated by reference to a few examples which provide insight into the general problem of national policy-making in atomic energy.

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ownership of such material used in nuclear power reactors. Public Law 88-489 (1964). The JCAE's report on this legislation attributes the 1954 decision to continue mandatory government ownership to (1) the fact that special nuclear material was then still in short supply, and (2) the desire to provide an additional constitutional basis for regulation of nuclear materials. H.R. Rep. No. 1702, 88th Cong., 2d Sess. 7 (1964). The report recited that the JCAE was "keenly aware of the fact that this legislation, representing the most sweeping amendment to the Atomic Energy Act since 1954, will vitally affect the future legal and economic structure of the industry," and expressed confidence that the legislation had received "the utmost in careful congressional scrutiny." *Id.* at 18. The proposed legislation was introduced in March 1963, and extensive hearings on the bill were held by the JCAE in both 1963 and 1964. The bill was reported to the House and to the Senate on August 5, 1964. It was passed by the Senate on the consent calendar without debate or discussion on August 6, 1964, 110 Cong. Rec. 17851 (daily ed. Aug. 6, 1964), and by the House on August 18, 1964, with some discussion, almost all of it by JCAE members. 110 Cong. Rec. 19514-19 (daily ed. Aug. 18, 1964).

<sup>64</sup> See preamble to administration bill, 100 Cong. Rec. 10801 (1954). The preamble to the 1946 act similarly recited the existence of unknowns making the legislation "necessarily . . . subject to revision from time to time." 60 Stat. 755-56 (1946).

<sup>65</sup> For example, it drew a distinction between licenses under § 103, known as "commercial licenses," to be issued only after the Commission made a determination of "practical value," and licenses under § 104 for facilities to demonstrate practical value. 68 Stat. 936, 937 (1954), 42 U.S.C. §§ 2131-34 (1958). To date, after ten years, no such finding of "practical value" has been made and no facilities have been licensed under § 103. Actually, the courses taken by the industry and by the AEC during the first decade of the 1954 Act probably render the substantive implications of the distinction between § 103 and § 104 licenses—a distinction regarded as important in 1954—quite trivial in 1964.

### A. *The Subsidy Problem*

The authors of the 1954 act were under no illusions about the then current economic realities of the nuclear industry; they would preclude widespread private participation in the development of nuclear power except by "relatively few firms."<sup>66</sup> Accordingly, the goal of nuclear power would be achieved through "flourishing research and development programs under both Government and private auspices."<sup>67</sup> It would appear, however, that the JCAE uncritically accepted the assumption that private enterprise was prepared, without government subsidy, to undertake investment necessary to make a major contribution to development of economic nuclear power. In any event, it does seem clear that the JCAE drew a sharp distinction between the area of government investment and the area of private investment.<sup>68</sup>

Shortly after the Atomic Energy Act of 1954 became law, AEC announced a program of financial incentives to encourage private construction, ownership, and operation of demonstration power reactors.<sup>69</sup> It is clear that the AEC was placing primary reliance upon this program to induce private investment in nuclear power development sufficient to obviate the necessity for a program of government construction, ownership, and operation of such reactors.<sup>70</sup>

<sup>66</sup> H.R. Rep. No. 2181, *supra* note 43, at 9.

<sup>67</sup> *Ibid.*

<sup>68</sup> See text at note 73 *infra*. It was clearly contemplated that private enterprise would stand on its own feet, and spokesmen for industry encouraged this view. See, for example, the testimony of Walker Cisler, President of Detroit Edison Co., Hearings Before the JCAE, *supra* note 47, at 134-37, in which he strongly asserted that no financial support would be requested of the government. A short time after the 1954 Act became law, Cisler's group filed a license application with AEC conditional upon substantial federal assistance. His organization, Power Reactor Development Co. (see note 122 *infra*), was a beneficiary of AEC's "first round" program. See note 69 *infra*.

<sup>69</sup> See 1 CCH At. En. L. Rep. ¶ 3021, which sets forth the text of AEC's press release of January 10, 1955. This was known as the "first round" of the Power Demonstration Reactor Program. A "second round" was announced eight months later on September 21, 1955, under which AEC would contribute to the costs of constructing reactors (principally for consumer-owned utilities) and would retain title to the reactor, *id.* at ¶ 3022, and a "third round" on January 7, 1957. *Id.* at ¶ 3023. For a description of the program, see Green, *The Strange Case of Nuclear Power*, 17 Fed. Bar J. 100 (1957). An official history of the program may be found in *Hearings Before the Subcommittee on Legislation of the JCAE on Cooperative Power Reactor Demonstration Program, 1963, 88th Cong., 1st Sess. 224-34 (1963)*.

<sup>70</sup> AEC's position was that the goal of the nuclear power program was "more scientific knowledge, not simply more kilowatts"; that the knowledge sought by AEC could best be obtained through construction of prototype plants constructed and operated by private organizations under conditions of "normal industrial and commercial incentives"; and that AEC's policy was to "avoid Commission construction of large-scale plants if the desired knowledge can be obtained by other reasonable means." *Hearings Before the JCAE on Accelerating Civilian Reactor Program, 84th Cong., 2d Sess. 25-30 (1956)*. Failure of the AEC's "first round" announcement

Under this program, the AEC would waive use charges for nuclear fuel, perform research and development in AEC laboratories on behalf of private reactor projects, and enter into fixed sum contracts under which AEC would in effect underwrite research and development programs conducted by the private group in connection with its reactor project.<sup>71</sup> In return for these forms of assistance, which amounted in some projects to many millions of dollars, the AEC would be entitled to all resulting technical and economic data, which would then be disseminated by the AEC to the technical public.<sup>72</sup>

This program raised considerable question as to the meaning of section 169 of the 1954 act, which provided:

*Section 169. No Subsidy.*—No funds of the Commission shall be employed in the construction or operation of facilities licensed . . . except under contract or other arrangement entered into pursuant to Section 31.<sup>73</sup>

Section 31 authorized the AEC to contract for private research and development activities relating, *inter alia*, to "industrial uses, the generation of usable energy, and the demonstration of practical value of [reactors] . . . for industrial or commercial purposes . . ." <sup>74</sup> A dispute quickly arose within the JCAE based on the unpublished (*i.e.*, executive session) legislative history as to whether or not the AEC's program for these financial incentives was legal, as within the excepting clause, or was illegal as misinterpreting the intent of that clause. The AEC itself contended that this was not a subsidy,<sup>75</sup> since funds were not being provided for bricks and mortar or for operation, but only for acquisition of research and development data which the AEC otherwise would have to obtain through construction and

to specify the types of reactors to be supported or to establish deadlines was interpreted by some as a surrender by AEC to utilities of direction and control of the program. Morrisson, *supra* note 62, at 211.

<sup>71</sup> See Green, *supra* note 69.

<sup>72</sup> The terms of the program required that all information derived from projects supported by the AEC would be "made available by AEC to the maximum extent practicable to the entire technical public working on reactor development, with resultant benefit to the progress of the entire nuclear power program." 1 CCH At. En. L. Rep. ¶ 3021 (AEC Press Release 1955).

<sup>73</sup> 68 Stat. 952 (1954), 42 U.S.C. § 2209 (1958).

<sup>74</sup> 68 Stat. 927 (1954), 42 U.S.C. § 2051 (1958).

<sup>75</sup> "Proponents of a Government program designed to aid a particular industry, group, or type of enterprise avoid and indeed resent the term 'subsidy' in describing their program, preferring to call it an aid or an expenditure necessary in the national interest or defense." Staff of the Joint Economic Committee, 86th Cong., 2d Sess., *Subsidy and Subsidylike Programs of the U.S. Government* 3 (Comm. Print 1960).

operation of duplicate facilities.<sup>76</sup> The JCAE ultimately adopted an interpretation of section 169, based on its own interpretation of the original legislative history, which interpretation, although far from unambiguous or explicit, seemed to support the proposition that the Power Demonstration Reactor Program was an improper subsidy.<sup>77</sup> Nevertheless, the program has continued without interference from the JCAE,<sup>78</sup> and millions of dollars of AEC funds have been invested in support of private reactor projects.<sup>79</sup>

### B. *The Problem of Indemnity*

Very shortly after the 1954 act became law, private enterprise organizations interested in constructing and operating reactors began to express grave concern about the very substantial public liability they might incur in the event of a serious reactor accident.<sup>80</sup> The classic formulation of this problem is as follows: The chances of a serious reactor accident are quite remote because of all the safety controls and precautions engineered into the reactor facility, but in the event such an accident occurred the damages incurred by the public might be catastrophic with resulting catastrophic, and perhaps bankrupting, public liability on the part of the reactor operator or equipment suppliers.<sup>81</sup> The potential liability was, moreover, far

<sup>76</sup> Address by AEC Chairman Lewis L. Strauss at Case Institute of Technology, Nov. 9, 1955. See also Hearings Before the JCAE on Development, Growth, and State of the Atomic Energy Industry, 84th Cong., 1st Sess. 156 (1956).

<sup>77</sup> S. Rep. No. 538, 84th Cong., 1st Sess. 7 (1955). The basis of this interpretation was that the excepting clause was intended solely to permit AEC to enter into contracts for specific research and development work after the reactor is built.

<sup>78</sup> Legislation enacted in 1957 required specific statutory authorization for AEC's Power Demonstration Program. 71 Stat. 274 (1957), 42 U.S.C. § 2017 (1958). As a result, JCAE participation in the implementation of the program has made the issue moot.

<sup>79</sup> AEC estimated that, as of June 30, 1963, it had provided financial assistance, *i.e.*, expenditures to assist industry in the development, construction, and operation of atomic energy facilities, in the total amount of about \$380 million. Of this, about \$49 million was for assistance to privately owned utilities under the Power Demonstration Reactor Program, and about \$300 million was for AEC-owned power demonstration projects undertaken in cooperation with consumer-owned utilities. See Hearings Before the JCAE on Development, Growth, and State of the Atomic Energy Industry, 88th Cong., 1st Sess. 234-51 (1963). This represents an immense expenditure of public funds for the benefit of one segment of American industry and appears to be without precedent. Morrison, *supra* note 62, at 209.

<sup>80</sup> See Hearings Before the JCAE on Development, Growth, and State of the Atomic Energy Industry, 84th Cong., 1st Sess. 8, 9, 59, 68, 187, 258, 388-89, 393-95, 404, 406, 492-93, 498-99, 549, 557, 575, 589, 590, 595 (1955).

<sup>81</sup> Assuming that there were 100 large power reactors operating in the United States, the Commission has found that the most pessimistic of the probabilities involved lead to the estimate that there would be less than 1 chance in 50 million of any one person getting killed in any year in a reactor incident as compared to 1 chance in 5,000 for getting killed in an automobile accident. It also concluded that hypothetical property damages range from a lower limit



beyond the capacity of the insurance industry to cover.<sup>82</sup> The problem was identified as a potential roadblock to private investment as early as January 1955, only five months after the 1954 act became law.<sup>83</sup> By 1957, it had become clear that private enterprise interest in nuclear power would dissipate almost entirely unless some formula were found to enable private industry to participate without risking devastating public liability.<sup>84</sup> The only answer to this problem was for the government to intervene as an insurer or indemnitor against these risks.

Surprisingly, however, this problem, which became obvious within only a few months after the 1954 act became law, was scarcely raised or discussed, and certainly not considered, when the atomic energy legislation was before the Congress.<sup>85</sup> Indeed, far from considering government assumption of the risks, the 1954 act pointed in the directly opposite direction, since it provided that licensees using special nuclear material *would indemnify the United States and the AEC* for any damages resulting from the use of the material.<sup>86</sup> Nevertheless, by 1956<sup>87</sup> it had become clear that Congress would enact legislation under which the government would indemnify licensees, and any other persons who might be liable to third parties on account of a nuclear accident, to the extent of 500 million dollars over and above the amount of financial protection reasonably availa-

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of about one-half a million dollars to an upper limit, in the worst imaginable case, of \$7 billion. This latter figure is largely due to a contamination of land with fission products. However, the estimates of experts on the occurrence of nuclear incidents at major reactors varied from those who were unable to be expressed in numbers to a range between 1 chance in 100,000 per year to 1 chance in a billion per year for such accidents. There was no disagreement that the probability of major reactor accidents was exceedingly low.

S. Rep. No. 296, 85th Cong., 1st Sess. 3 (1957).

<sup>82</sup> *Id.* at 7.

<sup>83</sup> Note 80 *supra*.

<sup>84</sup> A major factor in the industry, General Electric Company, stated in effect that it would withdraw from major participation in nuclear power development unless a solution to the public liability problem was found through federal legislation. Hearings Before the JCAE, Governmental Indemnity and Reactor Safety, 85th Cong., 1st Sess. 148, 156-67 (1957).

<sup>85</sup> The problem was mentioned, but only briefly, in testimony by a representative of General Electric Co. Hearings on S. 3323 and H.R. 8862, p. 334.

<sup>86</sup> 68 Stat. 930, 931 (1954). This provision has been amended to make the requirement applicable only to the extent that the Indemnity Act, *infra* note 88, did not apply. 71 Stat. 576 (1957), 42 U.S.C. § 2073 (e) (8) (1958).

<sup>87</sup> It appeared that an indemnity bill would be enacted in 1956, but it was held up in the House as a "hostage" to obtain subsequent enactment of legislation for a major program of construction of government-owned power reactors. See Green & Rosenthal 152 n.89. Pressure from industry, see note 84 *supra*, was so powerful that this ploy could not continue in 1957, and the legislation was enacted. 71 Stat. 576 (1957), 42 U.S.C. § 2210 (1958).

ble from insurance companies, with further liability cut off completely at that point.<sup>88</sup>

An indemnity commitment of this kind and magnitude, made to provide a viable financial environment for private enterprise investment in a particular technology, represents a major public undertaking involving important questions of public policy.<sup>89</sup> While the original 1954 commitment to rely heavily upon private investment for rapid development of nuclear power perhaps made it a logical necessity for the government to establish an indemnity program to make private investment feasible, the sequence and timing of the decisions do raise serious question about the manner in which public policy in atomic energy has been shaped. We have seen that within only a few months after the 1954 law was enacted, the government embarked upon a previously undisclosed and unanticipated subsidy program and became committed to an indemnity program which in essence reversed the policy reflected in the 1954 act. Would not the interests of responsible government have been better served had the necessity for subsidy and indemnity by the government been fully understood, disclosed, and debated in 1954? Would the Atomic Energy Act of 1954 have been enacted at that time under such circumstances?

### C. *The Question of State Jurisdiction*

The principal regulatory objective of the Atomic Energy Act is to protect the health and safety of the public against radiation injury which might be incident to the use of nuclear materials and facilities. It has been a generally accepted principle of the American federal system of government that the states have initial and primary responsibility and power for regulating industry within their borders

<sup>88</sup> 71 Stat. 576-79 (1957), 42 U.S.C. § 2210 (1958).

<sup>89</sup> The policy questions are twofold. First, should risks of this catastrophic immensity, albeit low probability, be indemnified against or should they be prohibited altogether? Query: would people drive more carefully if there were no automobile liability insurance? Would reactor owners be more cautious about safety if there were no government indemnity? Congressman Holifield vigorously opposed the indemnity legislation on the grounds that reactors should be built only in isolated areas until their safety is demonstrated, and that the indemnity act would encourage the taking of risks with respect to the public safety. 103 Cong. Rec. 10,716-17 (1957). On the other hand, if society is to assume some risk for the sake of technological progress, and the government is to be an indemnitor, why limit this policy only to licensed atomic energy activities? Why not also cover space vehicle launch accidents, transportation of rocket fuels, ground to air missiles, and nuclear bombs and warheads? For a justification of such additional coverage, see Rosenthal, Korn & Lubman, *Catastrophic Accidents in Government Programs* (1963). Aside from government programs, why not indemnify manufacturers of drugs and chemicals?

to protect the public health and safety.<sup>90</sup> On the other hand, the Congress has authority to enact legislation within the scope of the express or implied powers of the federal government to supersede such state regulation. Federal health and safety regulation of industrial activities usually has been imposed sparingly, and only where a definite problem is found to exist and state regulation is deemed inadequate.<sup>91</sup> Since technological problems tend to complicate the regulated activities and increase their potential for injury to the public health and safety, the justification for federal regulation, once imposed, tends to increase rather than diminish.<sup>92</sup>

The pattern of state-federal relationships in the atomic energy field has been at sharp variance with this usual pattern. The atomic energy technology came into being as a federal government enterprise largely beyond the power of the states to regulate. The health and safety of the public were protected by controls established by the AEC, *qua* proprietor. When the industry was opened to private participation by the 1954 act, that act laid down a complete statutory framework for regulation, in the interest of the public health and safety, of every activity involving source, byproduct, and special nuclear materials and nuclear facilities.

The justification for comprehensive federal regulation is readily apparent. Rapid development and growth of the industry was a paramount objective of national policy. State and local governments lacked the technical competence and trained manpower to impose effective regulation. But despite this obvious justification, it is a remarkable fact that the legislative history of the 1954 act is totally devoid of any possible interest of the states in health and safety regulation of any aspects of the atomic energy industry. The act itself seemed to assume that there was no such thing as state regulation.<sup>93</sup>

<sup>90</sup> Under the tenth amendment to the Constitution of the United States, powers not specifically granted to the federal government are reserved for the states. For a discussion of the legal bases for federal regulation of atomic energy activities, see Estep, *Federal Control of Health and Safety Standards in Peacetime Private Atomic Energy Activities*, 52 Mich. L. Rev. 333 (1954).

<sup>91</sup> The principal federal agencies concerned with regulatory health and safety aspects of industrial type activities are the Department of Labor, which has limited regulatory authority under the Fair Labor Standards Act, 52 Stat. 1060 (1938), 29 U.S.C. § 203 (1958), and the Walsh-Healey Act, *infra* note 103; and the Food and Drug Administration, whose activities extend only to food and drugs in interstate commerce, and not to manufacture *per se*.

<sup>92</sup> It would appear to be inevitable that technological progress tends to outrun the powers of local regulation and to require a shift of regulatory responsibility to larger units of government which can deal with wider areas of governance. See Gilfillan 36-37.

<sup>93</sup> The question of the possible interest in, responsibility for, and role of the states in health and safety regulation of atomic energy activities within their bound-

Characteristically, within a matter of a few weeks after the 1954 act became law, there commenced a torrent of discussion on, and interest in, the "role of the States."<sup>94</sup> Almost as an afterthought, it was recognized that the federal regulatory authority was being exercised in an area previously reserved to the states. Questions were now raised as to whether or not state industrial safety codes could or should be applied to federally licensed atomic energy activities within the states.<sup>95</sup> Many states even before 1954 had adopted regulations either dealing explicitly with radiation hazards of specific types, or written in general terms which could be extended to radiation hazards.<sup>96</sup> Many of the states actually embarked on study programs, or enacted legislation establishing at least an initial framework for coping with atomic energy regulatory matters. Some actually had adopted regulations dealing specifically with atomic energy activities.

A great deal of confusion and uncertainty prevailed. The principal basis for uncertainty was the question whether Congress, in enacting the 1954 act, intended to and had completely preempted the field of atomic energy regulation<sup>97</sup> or had left the states free to exercise coordinate or supplemental regulatory authority. After several years of discussion and debate, the Atomic Energy Act was amended in 1959<sup>98</sup> to clarify the matters. Under this amendment, the licensing and regulatory activities of the AEC were divided into two categories:

(1) Those functions which would continue to be exercised solely by the AEC:

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aries was never mentioned in the entire legislative history of the 1954 act. The only reference to any form of state responsibility related to the regulation of generation, sale, and transmission of electrical energy. See 68 Stat. 960 (1954), 42 U.S.C. § 2018 (1958).

<sup>94</sup> By early 1959, at least nine articles specifically dealing with the subject had appeared in law reviews, and the matter had been discussed in numerous other forums. For a bibliography as of that date, see Staff of the JCAE, *Selected Materials on Federal-State Cooperation in the Atomic Energy Field*, 86th Cong., 1st Sess. 519-20 (Comm. Print 1959). Even before the Atomic Energy Act was enacted, some states had begun to consider their role in this field. For a description of early state activities, see Krebs & Hamilton, *The Role of the States in Atomic Development*, 21 *Law & Contemp. Prob.* 182 (1956).

<sup>95</sup> See, e.g., Stason, Estep & Pierce, *Atoms and The Law* 851-1204 (1959).

<sup>96</sup> *Id.* at 888-916.

<sup>97</sup> Berman & Hydeman, *Federal and State Responsibilities for Radiation Protection: The Need For Federal Legislation* (1959). This book describes all phases of the problem as it stood when the legislation, *infra* note 98, was enacted. For a further discussion of the preemption issue, see Adams, *Regulation of Health and Safety in Private Atomic Energy Activities: A Problem in Federal-State Relationships*, 27 *Geo. Wash. L. Rev.* 163 (1958).

<sup>98</sup> 73 Stat. 688 (1959), 42 U.S.C. § 2021 (Supp. IV, 1963).

- (a) regulation of construction and operation of nuclear facilities;
  - (b) regulation of export and import of source, byproduct, and special nuclear materials, and nuclear facilities; and
  - (c) regulation of sea disposal of radioactive waste materials, and other methods of disposal of such waste materials which AEC determines require AEC licensing.<sup>99</sup>
- (2) Those functions which might now be assumed by the states:
- (a) regulation of source and byproduct materials;
  - (b) regulation of special nuclear materials in quantities not sufficient to form a critical mass; and
  - (c) regulation of waste disposal to the extent authorized by the AEC.<sup>100</sup>

Transfer of responsibility for the regulatory functions in the latter category would be arranged by agreement between the AEC and the state.<sup>101</sup> To this date eight states have assumed regulatory jurisdiction under such agreements.<sup>102</sup>

Thus, the federal government, having acquired regulatory authority over a broad area of technology, has adopted a program for passing a portion of this authority back to the states.<sup>103</sup> This, in itself, is somewhat of an innovation in government.\*

#### IV. THE GOVERNMENT-INDUSTRY RELATIONSHIP

It was recognized in 1954 that maximum progress towards develop-

<sup>99</sup> 73 Stat. 688-89 (1959), 42 U.S.C. § 2021(b) (Supp. IV, 1963).

<sup>100</sup> 73 Stat. 688-89 (1959), 42 U.S.C. § 2021(c) (Supp. IV, 1963).

<sup>101</sup> 73 Stat. 688-89 (1959), 42 U.S.C. § 2021(b) (Supp. IV, 1963). The agreement may be entered into only upon a certification by the Governor that the state has an adequate regulatory program and desires to assume regulatory responsibility; and a finding by AEC that the state program is compatible with AEC's and is adequate to protect the health and safety of the public.

<sup>102</sup> Arkansas, California, Kentucky, Mississippi, New York, Texas, Florida, and North Carolina. An agreement with Kansas is presently pending.

<sup>103</sup> A question has arisen concerning the authority of the Department of Labor to promulgate radiation safety and health standards applicable to licensees regulated by the six "agreement states." Such regulations have been issued pursuant to the Walsh-Healey Public Contracts Act, 49 Stat. 2036, 2038 (1936); 41 U.S.C. §§ 35, 38 (1958), to "afford the strongest possible protections to employees of Federal supply contractors against the hazards of occupational radiation." 29 Fed. Reg. 1437 (1964). The regulations exempted AEC licensees but were applicable to "agreement state" licensees. *Id.* at 1444. As a result of protests from the "agreement states," supported by AEC, the Labor Department stayed application of these regulations to licensees of the "agreement states" pending hearings on the question whether they should be so applicable. *Id.* at 1438.

\* A discussion of the interstate compact as a means of "passing back" authority to one or several states is found in this Symposium, Dixon, Constitutional Bases for Regionalism: Centralization; Interstate Compacts; Federal Regional Taxation, *supra* at 47. [Ed.]

ment of nuclear power could not be achieved either through exclusive reliance on government initiative and enterprise or by private enterprise alone.<sup>104</sup> There was visualized "teamwork between Government and industry . . . [as] the key to optimum progress, efficiency, and economy."<sup>105</sup> This simple formulation has led to a remarkable relationship between government and industry.<sup>106</sup>

When the 1954 act became law, the AEC owned and operated a vast industrial complex. The new act took nothing away from this industrial empire; the AEC continued, and still continues, to operate it. Private enterprise was invited to enter the industry and to exist as a small component of the industry, side by side with the very much larger government component. Moreover, the AEC continued to have the authority and the responsibility to assure an adequate rate of development of civilian applications of atomic energy, even if this meant doing some of the very same things which private enterprise otherwise might do.

The roadblocks to private enterprise entry into the industry were formidable. A utility interested in installing a nuclear power plant to produce needed electrical energy for distribution to its customers, along with the equipment manufacturer who would supply the reactor, would face the following problems:

(1) There was no body of experience on which to rely for estimating the economics of a nuclear power plant, but it was obvious in any event that nuclear power would not be economically competitive with conventional power plants for some years.<sup>107</sup>

(2) Nuclear fuel could be obtained only from the AEC at prices fixed by the AEC, and an important element in the plant's economics would be the price fixed by AEC for "buyback" of special nuclear material produced in operation of the plant.<sup>108</sup>

(3) Much of the necessary technological data was classified.

(4) Many of the non-nuclear materials and many of the services required for construction and operation of the reactor could be obtained only from the AEC.

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<sup>104</sup> H.R. Rep. No. 2181, supra note 43, at 9.

<sup>105</sup> Ibid.

<sup>106</sup> The concept of "teamwork" was quickly translated into the concept of "partnership" between government and industry. See Address of Lewis L. Strauss before the American Nuclear Society, Dec. 11, 1956, CCH At. En. L. Rep. (Tr. binder) ¶ 6811. The concept still has currency. See the address by AEC Chairman Glenn T. Seaborg on Government and Industry: A Partnership, at the dedication of Babcock & Wilcox Nuclear Development Center, April 11, 1964.

<sup>107</sup> As of this writing, there is still no nuclear power plant operating in the United States on an economically competitive basis.

<sup>108</sup> See note 62 supra.

(5) A serious accident in operation of the reactor, as discussed above,<sup>109</sup> could have catastrophic consequences resulting in astronomically high, potentially bankrupting public liability beyond the capacity of the insurance industry to cover.

At a very early stage, the AEC made the basic policy decision that the national interest would be served by relying primarily upon private enterprise to develop the peaceful applications of atomic energy.<sup>110</sup> Recognizing that every increment of public investment in development of peaceful applications would tend to deter private investment, the AEC's policy was to increase expenditure of AEC funds in development of the civilian technology (*i.e.*, in construction and operation of reactors designed to demonstrate power production) only as a last resort, where initiation of a project was necessary and private investment was unavailable.<sup>111</sup> In furtherance of this policy, the AEC set about to eliminate or ameliorate the "roadblocks" mentioned above and to create a financial environment conducive to private investment in the industry. To make the classified technology available to private industry, the AEC established its Access Permit Program, under which private industry would be permitted to obtain and use restricted data for purely private purposes, subject to investigation and clearance of personnel and to security regulations generally.<sup>112</sup> To ease industry's dependence upon the AEC for necessary non-nuclear materials and services, the AEC announced the general policy of ceasing to provide such materials and services whenever private industry was prepared to furnish them at reasonable prices;<sup>113</sup> beyond this, the AEC offered positive financial inducements for private industry to provide such materials and services.<sup>114</sup> Likewise, to offset partially the uneconomic aspects of the industry, AEC offered to share research and development costs in connection with power demonstration reactor projects,<sup>115</sup> and offered other

<sup>109</sup> See text at notes 80-84 *supra*.

<sup>110</sup> See note 70 *supra*.

<sup>111</sup> *Ibid.* See Green, *supra* note 69.

<sup>112</sup> This program represented a radical departure from traditional concepts of security which precluded dissemination of classified information except to properly "cleared" persons who had a definite "need to know" in order to accomplish government objectives. See Green, *The Atomic Energy Information Access Permit Program*, 25 Geo. Wash. L. Rev. 548 (1957); Green, *Atomic Energy Information Control*, 38 Chi. Bar Record 55 (1956); Green, *Information Control and Atomic Power Development*, 21 Law & Contemp. Prob. 91 (1956).

<sup>113</sup> For a description of these policies, see the testimony of the AEC General Manager in Hearings Before the JCAE on Development, Growth, and State of the Atomic Energy Industry, 84th Cong., 2d Sess. 80-85 (1956).

<sup>114</sup> *Ibid.*

<sup>115</sup> See notes 69-72 *supra*.

financial incentives such as waiver of use charges for special nuclear materials.<sup>116</sup> Moreover, the indemnity problem was resolved by enactment of new legislation in 1957.<sup>117</sup>

Thus, the AEC has played a vigorous and central role in the industry. It is by far the largest entrepreneur in the industry, the largest consumer of the industry's materials and services, and the largest producer of materials and services; it plays an active role in promoting the industry and in encouraging and subsidizing private interests to enter the industry at the same time that it is a potential competitor of these interests; and, finally, it licenses and regulates the private firms which it has encouraged and subsidized.

Unlike other forms of federal licensing and regulation where the principal issues are economic and involve competing or conflicting interests, the AEC's regulatory responsibilities are almost entirely concerned with assuring that licensed activities will not endanger the health and safety of the public.<sup>118</sup> Since the state of reactor technology is such that the costs of building safety factors into nuclear facilities constitute a major element of their total cost,<sup>119</sup> the stringency of AEC's regulation has a substantial bearing on the practical economic feasibility of licensed activities.<sup>120</sup>

The multiplicity of roles played by the AEC has raised questions concerning potentially serious conflicts of interest within the Commission organization.<sup>121</sup> The problem can be illustrated by the AEC's handling of the case involving the licensing of the Power Reactor Development Company's (PRDC) nuclear power reactor.<sup>122</sup> PRDC proposed to construct and operate a fast breeder reactor for the production of electricity to be distributed through the normal distribution channels of Detroit Edison Company, the leading member of the PRDC group. Construction of such a demonstration reactor was deemed by the AEC to be imperative in the nation's atomic

<sup>116</sup> Ibid.

<sup>117</sup> See text at notes 80-88 supra.

<sup>118</sup> See JCAE Staff, 87th Cong., 1st Sess., *Improving the Regulatory Process* 45-46 (Comm. Print Vol. I, 1961). The 1954 Act, as originally enacted, contained 25 separate references to the health and safety of the public.

<sup>119</sup> "Safety requirements amount to a substantial fraction of the total costs of construction of a reactor facility, and much expensive government and industry research is being devoted to the development of new ways to assure safety by means that are less costly." Id. at 47.

<sup>120</sup> Ibid.

<sup>121</sup> Ibid.

<sup>122</sup> AEC Docket No. F-16. The entire history of this proceeding is set forth in detail at 2 CCH At. En. L. Rep. ¶ 11,201 (1959). PRDC is a corporation organized by fourteen public utilities and seven equipment manufacturers. Id. at 17,225-48.



energy program,<sup>123</sup> but, in line with its general policy, the AEC agreed to rely upon PRDC to do the job, rather than to have such a reactor built by the government itself. In furtherance of the PRDC project, AEC made substantial research and development funds available to PRDC under the Power Demonstration Reactor Program.<sup>124</sup> The vehicle for this research and development assistance was a contract entered into between the AEC and PRDC which recited, among other things, that AEC and PRDC would carry out the contemplated program in a "spirit of partnership and friendly cooperation," and that PRDC would design, develop, construct, own, and operate the reactor plant in connection with which the research and development work was to be done, subject to its obtaining the necessary AEC license.<sup>125</sup> When the matter came before the Commission for consideration of the issuance of the construction permit, the permit was issued despite the existence of acknowledged safety problems and unknowns.<sup>126</sup> Indeed, it was issued notwithstanding the Commission's explicit failure to make the finding required under its own regulations, if not under the statute itself, that there is "reasonable assurance that a facility of the general type proposed can be constructed and operated at the proposed location without undue risk to the health and safety of the public."<sup>127</sup> It seems obvious that the

<sup>123</sup> *Id.* at 17,225-43.

<sup>124</sup> *Supra* notes 69-72.

<sup>125</sup> Portions of the contract are quoted in the testimony of Benjamin C. Sigal, Hearings Before the JCAE on Authorizing Legislation for AEC's Fiscal Year 1958 Construction Budget, 85th Cong., 1st Sess. 618 (1957).

<sup>126</sup> When an application for a reactor license is filed and is approved by AEC, a construction permit is initially issued. The construction permit is then convertible into an operating license after construction in accordance with the terms of the permit has been completed. 68 Stat. 954-55 (1954), 42 U.S.C. § 2235 (1958). In the PRDC case, the AEC's Advisory Committee on Reactor Safeguards found that there was "insufficient information" available to provide assurance that the reactor could be operated at the site (midway between Detroit and Toledo) without public hazard, and recommended an extensive experimental program to provide the necessary data. The text of the ACRS report is set forth in JCAE Staff, 87th Cong., 1st Sess., A Study of AEC Procedures and Organization in the Licensing of Reactor Facilities 128 (Comm. Print 1957). The Commission itself made findings of "uncertainty." *Id.* at 122. Only a short time earlier, the AEC Chairman had termed this type of reactor "the most hazardous of all reactors." Hearings before Subcommittee of the House Committee on Appropriations on Second Supplemental Appropriation Bill for 1957, 84th Cong., 2d Sess. 239 (1956). Eighteen months earlier, the AEC told the JCAE: "The proposed design of a fast breeder reactor for location in a populated area requires that the safety of this type of reactor be determined experimentally. This determination will probably require the construction of a reasonably similar prototype in an isolated area . . ." Hearings Before the JCAE on Development, Growth, and State of the Atomic Energy Industry, 84th Cong., 1st Sess. 203 (1955).

<sup>127</sup> The quoted language is from the then applicable AEC regulations, 10 C.F.R. § 50.35 (Supp. 1958), the text of which can be found in Atomic Energy Commission, Twentieth Semiannual Report 213, 217 (1956). Despite the obvious obsession

Commission's issuance of the construction permit<sup>128</sup> under these circumstances was based in large part at least on its desire to have this vitally necessary demonstration reactor constructed as quickly as possible.<sup>129</sup> Thus, the Commission's responsibility for development of nuclear power, especially by private enterprise, was squarely in conflict with its responsibilities as a licensing and regulatory body.

Although this problem of conflicting responsibilities has been studied,<sup>130</sup> and there has been some minor tinkering with the law<sup>131</sup> and with the AEC's organizational structure<sup>132</sup> in an attempt to minimize the problem, these multiple, conflicting functions and responsibilities remain concentrated in the hands of the Commission. The basic rationale for permitting regulatory responsibility to remain with the AEC, as opposed to vesting it in a new, independent nuclear licensing agency or in another existing body such as the Public Health Service, is four-fold:

- (1) There would be "obstacles to informal consultation and communication between the new agency's staff . . . and the AEC's staff

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of the drafters of the 1954 act with administrative procedure detail, the act and subsequent amendments are remarkably devoid of any standard of safety for use in determining whether a construction permit should be issued. See Green, *The Law of Reactor Safety*, 12 Vand. L. Rev. 115 (1958).

<sup>128</sup> Upon issuance of the construction permit, the United Automobile Workers, the International Union of Electrical, Radio, and Machine Workers, and the United Paperworkers of America filed a petition to intervene. The petition was granted and lengthy hearings ensued. See 2 CCH At. En. L. Rep. ¶ 11,201 at 17,201 (1959). The Commission's final decision and order upholding the construction permit were issued on May 26, 1959. *Id.* at 17,225-29-61. The intervenors appealed the Commission's order and the United States Court of Appeals for the District of Columbia set aside the grant of the permit. *International Union of Electrical, Radio, and Machine Workers, v. United States*, 280 F.2d 645 (D.C. Cir. 1960). The Supreme Court granted certiorari and reversed the decision of the Court of Appeals. 367 U.S. 396 (1961).

<sup>129</sup> The Commission's initial decision in the intervention proceeding included findings that the fast breeder reactor "is one of the most promising types for the development of electrical power on a commercially feasible basis," and that several years would be saved in meeting this objective by commencing construction before awaiting complete research and development results. 2 CCH At. En. L. Rep. ¶ 11,201, at 17,225-14 (1959).

<sup>130</sup> JCAE Staff, *supra* note 126; JCAE Staff, *supra* note 118; see also Berman & Hydeman, *The Atomic Energy Commission And Regulating Nuclear Facilities* (1961).

<sup>131</sup> In 1957, the Advisory Committee on Reactor Safeguards was elevated to statutory status, and provision was made for mandatory referral to it of significant reactor licensing actions. In addition, the same legislation made a public hearing mandatory on all major AEC reactor licensing actions. 71 Stat. 579 (1957), 42 U.S.C. § 2039 (1958). When AEC's interpretation of this provision resulted in multiple hearings on the same reactor, the act was again amended so as to make mandatory only one hearing, at the construction permit stage, on each reactor. 76 Stat. 409 (1962), 42 U.S.C. § 2239 (Supp. IV, 1963).

<sup>132</sup> AEC has reorganized its staff so as to achieve a complete separation of functions and responsibilities below the level of the Commission itself.

and contractors engaged in operating and safety research programs," so that the "knowledge and experience of one group would not be easily available to the other."<sup>133</sup>

(2) The shortage of technical personnel and "their reluctance to serve in an agency with no developmental functions" might make it difficult to staff the new agency.<sup>134</sup>

(3) The new agency could not develop a substantial safety research program without costly duplication of AEC's own efforts.<sup>135</sup>

(4) The new agency might "become preoccupied by safety considerations and thus not give adequate recognition to the need for pioneering the diverse peaceful uses of atomic energy," raising the possibility of "policy deadlocks" between the new agency and AEC.<sup>136</sup>

Thus, the continued existence of the AEC as a unique central authority acting as competitor, partner, supplier, customer, subsidizer, licensor, and regulator of private industry is justified on the basis of technological necessity.

There is much to be learned from the history of the relationship between government and industry in the field of nuclear technology. It may well be true that the play of competitive forces within the free, private enterprise system can develop an economically practical technology more quickly and efficiently than can a government enterprise. But private enterprise development of technology must necessarily proceed at a pace set by the economic factors of the market place. Private investment is subject to the forces of supply and demand and inevitably seeks profit and return. Where considerations of national policy demand that technological development be forced, particularly beyond the barrier separating the known from the unknown, private enterprise can progress only with substantial government moral and financial involvement. Moreover, the process of government involvement seems to generate an insidious escalation of the degree of involvement. Once the decision is made to rely upon private enterprise to force development, and private capital begins to flow, the process seems to become essentially irreversible, and the government seems to become committed to take whatever further steps may be necessary to enable private enterprise to fulfill its mission. In nuclear technology, this process has led to an

<sup>133</sup> JCAE Staff, *supra* note 118, at 64.

<sup>134</sup> *Id.* at 65.

<sup>135</sup> *Ibid.*

<sup>136</sup> *Ibid.*

unprecedented form of intermingling of government and private interests, from which disentanglement is not foreseeable.

Expansion and development of the nuclear technology involve inherent risks to the health and safety of the public which complicate the government-industry relationship. Some such risks may not be amenable to minimization or control, and national policy may dictate that they be assumed. But the risks to health and safety involved in the development of nuclear power can be minimized drastically and controlled merely by the expenditure of larger sums of money to achieve higher degrees of safety.<sup>137</sup> If nuclear power development had been undertaken as an exclusively governmental enterprise, at least until reactor technology had reached the point where safety of operation had been established, the incurring of larger costs to assure safety would be completely tolerable. However, where government attempts to meet national policy goals by relying on private enterprise to force technological development to the economic break-even point, these larger costs may be intolerable and may mean the difference between investment and non-investment. Consequently, once the commitment is made to rely upon private enterprise, the government necessarily is compelled to balance its health and safety regulatory responsibilities—in highly technical areas which are rarely all black or all white—against the necessity for producing a level of private technological effort adequate to meet national objectives. This dilemma is implicit in the justification for not accomplishing a complete separation of the regulatory and promotional functions presently vested in the AEC.

It may well be, despite these difficult problems, that the system presently prevailing is preferable as a matter of national policy to reliance on an expanding government enterprise.<sup>138</sup> We have reached the present point, however, without any real consideration of the implication of either policy, and without any conscious and deliberate policy decisions within the ordinary framework of American democratic processes. The development of atomic energy policy has taken place largely within a small, closed circle of government atomic

<sup>137</sup> "[I]f we wanted to put containment on top of containment, we can make a nuclear plant meet any safety criterion." Remarks of Chauncey Starr, Safety and the Public—Responsibilities of the Atomic Community: A Panel Discussion, in Proceedings of the 1963 Annual Meeting of The Atomic Industrial Forum 131 (1964).

<sup>138</sup> "The fundamental problem of the working of our social institutions for eliciting, paying for, and securing early and widespread use of desirable inventions has never been completely examined. It is a problem calling for a national policy." Gilfillan 26. Twenty-seven years later, after an era of unprecedented technological advance, this statement remains wholly valid.

energy specialists, on the apparent assumption that atomic energy represents a totally unique and isolated problem separate from other technological concerns of the government.

## V. THE ROLE OF THE SPECIALISTS

The tendency to rely upon "experts" to conduct the national atomic energy program raises some very interesting questions. As early as 1953, a leading member of the Atomic Energy Commission commented on this tendency and pleaded for broader participation in the program.<sup>139</sup> Nevertheless, as we have already observed, the affairs of the AEC have been and still are largely in the hands of the "experts," the JCAE and the AEC,<sup>140</sup> who have set policy and conducted the program as if nuclear technology were a unique end in itself, capable of being understood and handled only by the experts.

One consequence of this specialized isolation is that the JCAE and the AEC usually have been able to force the development of nuclear technology at a much faster rate than potential users of the technology are able to absorb the technology into their own systems.<sup>141</sup> For example, based on an interest expressed by the Air Force for development of an "advanced technology" to meet a "potential requirement," about 100 million dollars were spent over a seven-year period in the development of a compact reactor known as SNAP-10A, designed to provide approximately 500 watts of auxiliary electric power for space applications.<sup>142</sup> By 1964, this development had reached the point where a flight test was necessary to resolve questions concerning the operation of the device in a space environment. Also, by this time, the Air Force had reached the decision, in evaluating the priorities for various technological developments within its own budgetary constraints, that the SNAP-10A device did not warrant sufficient priority for a flight test in fiscal year 1965 because no immediate and urgent requirement existed for such units. The Air Force's decision on priorities was reflected in the President's

<sup>139</sup> Address of Thomas Murray, Don't Leave Atomic Energy to the Experts, at Marquette University, Dec. 3, 1953.

<sup>140</sup> Palfrey Address.

<sup>141</sup> See Address by AEC Commissioner James T. Ramey on The Requirements Merry-Go-Round in Government Research and Development on April 20, 1964, in Washington, D. C., reprinted at 110 Cong. Rec. 9210-13 (daily ed., April 29, 1964).

<sup>142</sup> For a discussion of this example, see H.R. Rep. No. 1332, 88th Cong., 2d Sess. 21-22 (1964); Margolis, R and D on Capitol Hill, Bulletin of the Atomic Scientists 33, 36 (May 1964).

budget which ruled out an immediate flight test, and the AEC, as an element of the executive branch, was precluded from contesting this decision. The JCAE, as a specialist with a vested interest of its own, worked vigorously to assure that this technology would gain acceptance and practical application as soon as possible.<sup>143</sup> Its view was that the practical value of a successful development project must be demonstrated regardless of priorities or immediate need, and that successful demonstration would in itself establish the actual operational requirements for the device. The nub of its position was outright rejection of priorities based on budgetary constraints.<sup>144</sup> As a result, the JCAE authorized funds in excess of those requested in the President's budget in order to make an early flight test possible,<sup>145</sup> and the Bureau of the Budget, yielding to JCAE pressure, indicated that it would go along with the test.<sup>146</sup>

Another consequence of specialization also has been emerging in the government's atomic energy structure. This is the tendency to convert the AEC into a body consisting of more specialized competence (*i.e.*, scientists and engineers) and less generalized competence (*i.e.*, lawyers and professional administrators).

The original concept of the Commission was that its members would be drawn from varying backgrounds, so that a broad range of judgment could be brought to bear on the very difficult problems involved in this technology.<sup>147</sup> The first Commission consisted of a lawyer-administrator, a physicist, a businessman-financier, an investment banker, and a newspaperman. From 1946 until 1955, the Commission at all times had one scientist member.<sup>148</sup> Since 1955,

<sup>143</sup> The JCAE tendencies appear to resemble those of the "scientists" as portrayed by Senator Bourke Hickenlooper, a JCAE member: "[It is] possible that scientists may have a little bit of what we might call the Parkinson's law philosophy, that given an area in which to operate they believe that that area should be extended ad infinitum with unlimited funds and so on for the purpose of developing their activities." Hearings Before the Senate Committee on Aeronautical and Space Sciences on Testimony of Scientists on Goals of the Nation's Space Program, 88th Cong., 1st Sess. 24 (1963).

<sup>144</sup> As another JCAE member, Congressman Chet Holifield, expressed it: "In an effort to economize through budgetary restrictions, we must not lose the freedom to explore various scientific avenues of exploration. We must not in the pursuit of economy, freeze scientific curiosity to the point where discovery and development is precluded." 110 Cong. Rec. 9210 (daily ed. April 29, 1964). Commissioner Ramey, who was Executive Director of the JCAE staff from 1955 to 1962, argues that promising developments should be carried through the demonstration stage whether or not an actual requirement exists. *Id.* at 9212.

<sup>145</sup> H.R. Rep. No. 1332, *supra* note 142, at 21.

<sup>146</sup> Margolis, *supra* note 142.

<sup>147</sup> See notes 22 and 23, *supra*.

<sup>148</sup> Dr. Robert F. Bacher served from Nov. 1, 1946, to July 3, 1948, and was replaced by Dr. Henry D. Smyth, who served until Sept. 30, 1954, when he was replaced by Dr. Willard F. Libby.

there have been two scientist members for a good portion of the time,<sup>149</sup> and during much of this period there was also at least one engineer member.<sup>150</sup> In 1964, a third scientist was appointed to the Commission.<sup>151</sup> Throughout the entire period, one or two lawyers also have been members of the Commission. Interspersed with these have been an accountant and one or two industrialists. At the present time the Commission consists of three scientists and two lawyers. The chairmanship of the Commission has been held by a scientist only from 1961 to date.<sup>152</sup>

It is not fruitful to attempt to draw a sharp line of demarcation between "two cultures" in considering the wisdom of this tendency to man the Commission with scientists.<sup>153</sup> A number of the scientists who have served on the Commission came to the Commission with a background of executive and administrative experience,<sup>154</sup> and the engineers who have served on the Commission have had broad and successful experience in business and industry. One can, however, question the wisdom of this tendency in terms of its reflection of an apparent attitude that the Commission should consist in major part of a body of specialists. Although matters of science and engineering are, of course, highly relevant to the atomic energy program, they ought not, and probably do not, figure largely in the matters of basic policy which are the primary concern of the commissioners. The main functions of the Commission are to lay down policies for the conduct of a very large operating program in a business-like manner and to formulate basic policies as to scope, priority, and direction—all within a broad political context and in the broadly defined public interest. Moreover, it would appear doubtful, at least, that scientific and engineering specialization is particularly

<sup>149</sup> Dr. John von Neumann served with Dr. Libby from March 15, 1955 till the former's death on Feb. 8, 1957. From that time until 1961, there was only one scientist member: Libby, succeeded by Dr. John H. Williams (Aug. 13, 1959, to June 30, 1960). From June 30, 1960, until Dr. Glenn Seaborg assumed the chairmanship early in 1961, there was no scientist member. Dr. Leland Haworth joined Dr. Seaborg on the Commission in the spring of 1961, and was replaced by Dr. Gerald Tape in late 1963.

<sup>150</sup> Robert E. Wilson served from March 22, 1960, until early in 1964. John A. McCone served from July 14, 1958, to Feb. 1961.

<sup>151</sup> Dr. Mary Bunting was appointed in April 1964.

<sup>152</sup> Dr. Glenn Seaborg has served as chairman since early 1961.

<sup>153</sup> Address of AEC Commissioner John G. Palfrey, Government, Science, and the Distracted Scholar, at the University of Maryland, Nov. 8, 1963.

<sup>154</sup> For example, Dr. Seaborg and Dr. Bunting were formerly university presidents, and Dr. Tape was director of the Brookhaven National Laboratory.

appropriate from the standpoint of the AEC's increasing regulatory responsibilities and functions.\*

Although a causal connection is not clear, the general position of the Commission as a governmental body has undergone considerable change since 1955, when the appointment of a second scientist member initiated the trend towards specialization. Since that time the ascendancy of the JCAE has significantly reduced the AEC from the policy-creation level to the level of staff-like assistance to the JCAE in the latter's establishment of policy. Simultaneously, and perhaps in part as an executive defense against JCAE encroachment, executive policies in atomic energy have been increasingly made within the White House complex rather than within the Commission itself.<sup>155</sup> What is clear is that a body of specialists is better equipped to perform staff functions ancillary to the formulation of policy than actually to formulate policy itself. The process of policy formulation usually is, as it should be, considerably broader than the field of specialization.<sup>156</sup>

If it is true that the increased scientist component among the five commissioners has had some causal relationship to the decline in Commission prestige and policy formulation functions, this has also contributed to some lessening of the JCAE's power, since other and higher echelons of the executive branch which have assumed responsibility for policy formulation are less vulnerable than the AEC to JCAE domination. Nevertheless, the JCAE itself has provided impetus for enhancing the role of the scientific specialist within the AEC, particularly in the regulatory field.

In 1960, the JCAE staff, assisted by outside consultants, embarked upon a major study of the AEC regulatory process. The study was published in March 1961<sup>157</sup> and concluded, not surprisingly, that the regulatory task of the AEC was unique and "unlike the usual proceeding before a regulatory agency."<sup>158</sup> Among the items listed as the "dominant and distinguishing characteristics" of the AEC regulatory program were the following:

(1) The AEC staff role is typically not to "resolve a controversy between private interests or between a private interest and the

\* For a general discussion of the role of lawyers as mediators between science and government, see Beresford, *Lawyers, Science, and the Government*, infra at 181. [Ed.]

<sup>155</sup> This development is discussed by Palfrey, *Palfrey Address*.

<sup>156</sup> See Mesthene, *Can Only Scientists Make Government Science Policy?* 145 *Science* 237 (July 17, 1964).

<sup>157</sup> Supra note 118.

<sup>158</sup> Id. at 45.



public interest but simply to reach a sound judgment as to the safety of a proposed reactor."

(2) This judgment is typically "not based on facts but on an admixture of facts, scientific and engineering theory and experimentation, and policy considerations."

(3) The proper task of review is not merely to determine the fairness of the staff's judgment and the adequacy of the supporting record, "but to decide whether the staff's safety finding, on which so much depends, was the right one."<sup>159</sup>

It is not clear in what sense the study used the terms "staff" and "review." It should be understood that the statute required a public hearing in every nuclear power reactor licensing case.<sup>160</sup> In each such case, the AEC staff, *i.e.*, the Division of Licensing and Regulation, prepared an analysis of the hazards which formed the basis for the position taken by the staff in the hearing.<sup>161</sup> This analysis memorandum was reviewed by the AEC's Advisory Committee on Reactor Safeguards which, in turn, submitted a report to the Commission.<sup>162</sup> Thus the staff consideration of the matter in no real sense constituted an official "judgment" on the issue. The judgment on the record was made by the AEC hearing examiner, a lawyer with no particular education or experience in reactor technology, subject to review by the five-man Commission.<sup>163</sup>

In any event, having defined the uniqueness of the AEC regulatory problem, the staff study called attention to certain "difficulties," among which was that there was no provision for review of "staff determinations by a technically qualified body," since the hearing examiner was not "technically qualified," and the Commission itself "may include no member technically qualified in reactor safety matters."<sup>164</sup>

There emerged from this background a mandate from the JCAE to the AEC, part statutory and part legislative history, under which the hearing examiner has been replaced by a three-man Atomic Licensing and Safety Board to hear reactor licensing cases and make either intermediate or final decisions, as the Commission directs. This

<sup>159</sup> *Ibid.*

<sup>160</sup> Green & Rosenthal 17-19.

<sup>161</sup> JCAE Staff, *supra* note 118, at 20-21.

<sup>162</sup> *Ibid.*

<sup>163</sup> The hearing examiner's decision would become final unless the Commission reviewed the decision on its own initiative, or on the application of the applicant, the AEC, or an intervenor. *Id.* at 22.

<sup>164</sup> *Id.* at 50.

Board is to consist of two "technically qualified" persons and a third person "qualified in the conduct of administrative proceedings."<sup>165</sup> There is to be a general "informalizing" of the hearing procedures to accommodate the scientific and engineering experts.<sup>166</sup>

These modifications represent yet another example of improvisation to meet the insatiable demands of technological progress. Entrusting "technically qualified" officials with basic decisional responsibility in reactor licensing cases undoubtedly will speed the development of nuclear power technology, a matter of clear public interest, but it is by no means certain that "technically qualified" persons have any real competence to balance this objective against the other major public interest involved—the public health and safety. It is universally recognized that some risk to the public health and safety "must be tolerated" every time a reactor is built. The real question is whether or not this risk, which depends in large part on scientific and engineering prediction, should be measured primarily in the esoteric terms of the practitioners of the technology, who have no real background of competence and experience in balancing the kinds of considerations which are always involved in the world of practical affairs, and who have no background in the application of legal principles to factual situations. Putting this another way, reliance on the specialists in the basic adjudicatory decisions means that, in its impatience to speed technological development, society is prepared to have important decisions affecting private rights made in the exotic sphere of science, rather than to compel the scientists to come to terms with society by finding ways to

<sup>165</sup> 76 Stat. 409 (1962), 42 U.S.C. § 2241 (Supp. IV, 1963).

<sup>166</sup> The legislative history of this amendment reflected the JCAE's intention to create a "flexible experiment in administrative law." AEC was exhorted to adopt "informal procedures" and "methods in addition to trial-type proceedings for the development of scientific and technical information affecting safety." H.R. Rep. No. 1966, 87th Cong., 2d Sess. 6 (1962). The Committee expressed the intent—if not encouragement—that AEC use non-lawyers as well as lawyers as the Board member "skilled in the conduct of administrative proceedings." *Id.* at 5. The entire tenor of the hearings on this legislation reflected a highly critical JCAE attitude towards the role of legally trained personnel in the AEC regulatory field and towards legal procedures generally. See Hearings before the JCAE on Radiation Safety and Regulation, 87th Cong., 1st Sess. 250 (1961). For a description of how hearings might be conducted in a streamlined fashion to accommodate the technical temperament, see the proposal of William Mitchell and David F. Cavers, who served as consultants to the JCAE staff in its study. *Id.* at 50; see note 118 *supra*. The AEC itself has promulgated an outline for the conduct of proceedings by Atomic Safety and Licensing Boards. This outline is in essence a "how to do it" layman's guide which tells the "technically qualified" Board members, *inter alia*, what laws and regulations they should become familiar with, how they should prepare for hearings, what prehearing conferences are, what procedures are observed in formal hearings, the ground rules for intervention, how testimony is taken, how to rule on objections, and what "official notice" is. 1 CCH At. En. L. Rep. ¶ 3562 (1963).

reduce their own forensic efforts to forms of communication which are intelligible to the public at large, and particularly to those who administer the ordinary processes of law.\* As the AEC's Director of Regulation, a lawyer, put it,

[T]hese questions are not deep scientific questions that can only be resolved back in somebody's laboratory. Sure, we need and could not move without the help of competent technical people, and we get that help. We who are not technically trained cannot determine the calculations, and we cannot determine what the technical safety question is, and, therefore, what the risk is. But once that has been identified to us, you and we and anybody with reasonable training can make a commonsense judgment as to whether the risk is acceptable or not.<sup>167</sup>

The new approach to administrative procedure thrust upon the AEC by the JCAE can have an important bearing on the adjudication of real issues involving important public and private interests and rights. In an age in which science and technology are becoming increasingly important and have an increasing impact upon society, it is undoubtedly necessary to reexamine the adequacy of our legal institutions, both judicial and administrative, for dealing with highly technical issues of this character. Such a reexamination should not, however, be confined only to atomic energy administrative procedures, which are in no real sense unique. Lawyers play the central role in almost every form of adjudication of issues arising under law in American society, including, frequently and in many diverse areas, adjudication of highly abstruse scientific and technical matters of the same order of complexity as are found in atomic energy licensing cases. If adversary type proceedings are inappropriate in these AEC cases, they are equally inappropriate in other administrative agency forums.<sup>168</sup> If lawyers are not quali-

\* Another view of this "exotic sphere of science," in the context of adjudicating the export of American technical data, is found in Davison, *Exports of Technical Data and the Export Control Act: Hearing Examiners and Consent Decrees*, *infra* at 209. [Ed.]

<sup>167</sup> Hearings Before the JCAE, *supra* note 164. It has been pointed out that science, which emphasizes progress and change, tends to undermine the juristic order, which sets forth the "right way" to do things. "Whether and to what extent one applauds or deploras such developments, they have to be taken into account; they tend to downgrade the jurist and upgrade the expert, who, however, being a specialist, cannot play in society the same role as the jurist previously performed." DeJouvenal, *The Political Consequences of the Rise of Science*, *Bull. of the At. Sci.* 2, 3-4 (Dec. 1963).

<sup>168</sup> See S. Rep. No. 1480, 87th Cong., 2d Sess. (1962), in which the Subcommittee on Administrative Practice and Procedure of the Senate Judiciary Committee cites questions relating to establishment of air service, pricing of natural gas products in the field, and distribution of radio and television channels as posing similar problems.

fied to make sound decisions under established legal standards in reactor cases, they are equally unqualified to decide cases in other forums where other highly abstruse and technical issues of fact are involved.<sup>169</sup> Nevertheless, once more atomic energy has been singled out as a unique problem requiring a unique solution.<sup>170</sup> A new form of administrative jurisprudence is being fashioned largely by the JCAE, a body which, despite its competence and specialization in nuclear matters, has no particular "expertise" in administrative law.

## VI. CONCLUSION

The atomic energy experience is a useful example of the accommodation of government and legal mechanisms to meet the demands of mushrooming technological development which seemingly outraces the ability of society to accommodate itself to the past and the present let alone the future. In this particular situation, the technology and its problems have been treated as a unique "sacred preserve,"<sup>171</sup> largely immune to influences derived from the traditions and principles of the past, and capable of contributing very little to the enlightenment or advancement of other areas of government.<sup>172</sup> In part this insularity is due to the special role and power of the JCAE and to the peculiar relationship between the JCAE and the AEC. This relationship has tended to exclude others from the decisional process, and has enabled policy to be made essentially be-

<sup>169</sup> See Posnack, *Special Judges for Patent Cases?* 50 A.B.A.J. 475 (1964). Admiral Hyman G. Rickover, in an address delivered on May 1, 1964, at the Philadelphia Bar Association's Law Day ceremonies, 110 Cong. Rec. 10,143-45 (daily ed. May 11, 1964), discussed the enormous "potentialities for injury to human beings and to society" created by the pressures of the technologists to alter our lives—"almost as if technology were an irrepressible force of nature to which we must meekly submit."

He views the law as the instrumentality for maximizing the benefits of science while guarding against harmful uses, and he urges lawyers to assume "as a special civic responsibility" the task of helping the public find right solutions to these problems.

<sup>170</sup> In major part, the difficulties within the AEC administrative program found by the JCAE seem to involve mainly the uncontested proceedings where a hearing is required by the statute. *Supra* note 131. In these cases, the AEC staff generally functions in a manner calculated to achieve an expeditious and favorable result for the applicant. Perhaps the AEC staff should abandon this role and adopt a posture of healthy and skeptical opposition to the application. As Dr. Philip Abelson pointed out in a different context, "a mechanism for some kind of devil's advocate" would be a useful device for assessing the validity of scientists' viewpoints and recommendations. Hearings on Goals, *supra* note 143, at 22.

<sup>171</sup> Palfrey Address.

<sup>172</sup> For example, Landis, in his study of the federal regulatory agencies (Landis, *Report on Regulatory Agencies to the President-Elect* (1960)), made no mention whatsoever of the AEC and its problems, even though at the very moment he was preparing his report (which touched on comparable problems in other agencies), the entire atomic energy community was absorbed in a study of its indigenous administrative problems.

tween the principals with minimal need to justify their decisions on their merits to higher—or even other—authorities. Expediency, rather than principle, has been the watchword of the nation's program for development of nuclear technology. History cannot yet judge the correctness of this approach.

It is clear, however, despite the seemingly "high-riding" vitality of the atomic energy government establishment, that the innovations and techniques initiated by the establishment will not be adapted for use in analogous areas. Congress seems little disposed to question the atomic energy establishment, but it does seem to feel that it has little to offer towards a solution of other problems. Despite the "success" of the JCAE over a period of seventeen years, Congress has not seen fit to create other similar committees or even to borrow any of the JCAE's techniques. In creating a framework in 1958 for handling the national space program, it considered and explicitly rejected a commission form of organization patterned after the AEC. The unique information control structure of the Atomic Energy Act after seventeen years remains unique despite its apparent effectiveness in protecting nuclear secrets.<sup>173</sup> And the principle of the atomic energy indemnity legislation has not been carried over into other areas.<sup>174</sup>

In all likelihood, the national atomic energy program will continue to have an impact on the fabric of government in the future similar to the impact of the past. Its long-range vitality is, however, questionable. As atomic energy spreads into wider areas—preservation of food and drugs, propulsion, space, medicine, power—and becomes more commonplace, it is likely that its extensions into these areas will be absorbed by other government agencies with primary responsibilities in these areas. Thus, one can visualize a steadily shrinking domain for the AEC and the JCAE. Meanwhile, in all likelihood, the national atomic energy program will remain an object of curiosity but not of example.

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<sup>173</sup> There is no known instance of subversive penetration of the AEC security program. The House Select Committee on Astronautics and Space Exploration termed the information control provisions of the Atomic Energy Act "a latent danger to the life of this democracy." H.R. Rep. No. 1758, 85th Cong., 2d Sess. 18 (1958).

<sup>174</sup> *Supra* note 89.